Former Joliet Army Ammunition Plant
Will County, Illinois

Final
2014 Annual Groundwater Monitoring Report

Long-Term Monitoring for Multiple Groundwater Sites

Prepared For:
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ACRONYMS AND ABBREVIATIONS

ACSIM	Assistant Chief of Staff for Installation Management
Army	United States Army
2-AT	2-aminotoluene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm/sec	centimeters per second
CO_2	carbon dioxide
COCs	contaminant of concern
1,1-DCA	1,1-dichloroethane
cis-1,2-DCE	cis-1,2-dichloroethene
2,4-DNT	2,4-dinitrotoluene
2,6-DNT	2,6-dinitrotoluene
2-A-4,6-DNT	2-amino-4,6-dinitrotoluene
4-A-2,6-DNT	4-amino-2,6-dinitrotoluene
DO	dissolved oxygen
DNB	1.3-dinitrobenzene
ft	foot/feet
ft/day	feet per day
ft/ft	feet per foot
ft/yr	feet per year
GMZ	groundwater management zone
GOU	Groundwater Operable Unit
GRU	Groundwater Remedial Unit
H_2O	water
HMX	high melting-point explosive
IAC	Illinois Administrative Code
ICs	institutional controls
IEPA	Illinois Environmental Protection Agency
in.	inch
J	estimated concentration
JOAAP	former Joliet Army Ammunition Plant

LAP	Load-Assemble-Package Area
LTM	long-term monitoring
LTM Plan	Final Long-term Monitoring Plan for Environmental Remediation Services, TolTest/MWH, March 2010
MDL	method detection limit
MFG	Manufacturing Area
mg/L	milligrams per liter
ml/min	milliliters per minute
MNA	monitored natural attenuation
MNTP	Midewin National Tallgrass Prairie
MRL	method reporting limit
MS/MSD	matrix spike/matrix spike duplicate
MWH	MWH Americas, Inc.
NB	nitrobenzene
ND	not detected
NPL	National Priority List
2-NT	2-nitrotoluene
OD	outside diameter
ORP	oxidation-reduction potential
OUs	operable units
PL	Public Law
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
RA	remedial action
RDX	Research Department Explosive
Report	2014 Annual Groundwater Monitoring Report
RG	remediation goal
RI	Remedial Investigation
1998 ROD	Record of Decision for the Soil and Groundwater Operable Units on the Manufacturing and Load-Assemble-Package Areas, National Priorities List Sites (U.S. Army, October 1998)
SOPs	standard operating procedures

SOU	Soil Operable Unit
SpC	specific conductivity
SRU	Soil Remedial Unit
SRU2	metals contaminated soil
SVOC	semivolatile organic compound
TAL	target analyte list
TAT	2,4,6-triaminotoluene
1,1,1-TCA	1,1,1-trichloroethane
TCE	trichloroethene
TNB	1,3,5-trinitrobenzene
TNT	2,4,6-trinitrotoluene
TOC	top of casing
Toltest	Toltest, Inc.
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UXO	unexploded ordnance
VOC	volatile organic compound

1.0 INTRODUCTION

This 2014 Annual Groundwater Monitoring Report (Report) has been prepared by MWH Americas, Inc. (MWH) for environmental remediation services at the former Joliet Army Ammunition Plant (JOAAP) on behalf of the United States Army Environmental Command (USAEC) under Assistant Chief of Staff for Installation Management (ACSIM) Firm-Fixed Price Contract No. W9124J-14-P-0142. Sampling activities conducted in 2014 did not follow the typical schedule. Toltest, Inc. (Toltest) did not complete the first quarter sampling at Landfill M13 (typically conducted in January) prior to their bankruptcy. The second quarter sampling (semi-annual round, typically conducted in April) was conducted in October, the third quarter sampling (Landfill M13 only, typically conducted in July) was conducted in November, and the fourth quarterly sampling (annual round, typically conducted in October) was conducted in December.

This Report presents 2014 groundwater quality data for the long-term monitoring (LTM) program of the Groundwater Operable Unit (GOU) and landfill inspection documentation for the Soil Operable Unit (SOU) at the former JOAAP in response to the *Record of Decision for the Soil and Groundwater Operable Units on the Manufacturing and Load-Assemble-Package Areas* (U.S. Army, 1998), (1998 ROD) for JOAAP. The remedy that was selected for the GOU Sites at JOAAP was monitored natural attenuation (MNA). As a function of the MNA remedy for the Groundwater Remedial Units (GRU), LTM is required. This requirement is intended to satisfy three primary objectives:

1. Monitor contaminant concentration reductions and plume migration;

2. Verify containment of contaminant concentrations greater than the Remediation Goal (RG) within the groundwater management zones (GMZ); and

3. Evaluate the effectiveness of SOU remedial action (RA) and MNA for the GOU remedy.

These objectives are being met through implementation of the LTM program.

In addition to the GOU, SOU remedial actions included the construction of three landfills at Sites L3, M11, and M13. Landfill inspections are required quarterly to determine if the remedy continues to function as designed. The Post-closure Landfill Inspection Report, Third Quarter (November) 2014 and the Post-closure Landfill Inspection Report, Fourth Quarter (December 2014) for landfills L3, M11, and M13 are included in Appendix A. The first quarter landfill inspection (typically conducted in January) was not conducted by Toltest prior to their bankruptcy. The Post-closure Landfill Inspection Report, Second Quarter (October) 2014 is included in the Final *2014 Semi-annual Groundwater Monitoring Report* (MWH, January 2015).

The objective of this report is to provide a review of the groundwater quality sampling results from 2014, and provide documentation of landfill inspections. Analytical data for historic and 2014 data have been included in tables presented in this Report. Additionally, water table and potentiometric surface maps for the third quarter (Landfill M13, November) and fourth quarter (December) sampling events are included. Water table and potentiometric surface maps for the second quarter (October) sampling event are included in the Final *2014 Semi-annual Groundwater Monitoring Report* (MWH, June 2015).

1.1 FACILITY DESCRIPTION AND BACKGROUND

Joliet Army Ammunition Plant is a former United States Army (Army) munitions production facility located on approximately 36 square miles (23,542 acres) of land in Will County, Illinois (Figure 1-1). The former facility is located approximately 60 miles southwest of Chicago and 14 miles south of Joliet, Illinois. As shown on the Groundwater Study Areas and Landfill Sites Map (Figure 1-2), the JOAAP property is divided into two main functional areas: the Manufacturing Area (MFG), west of Route 53, and the Load-Assemble-Package Area (LAP), east of Route 53. The facility has been described in detail in Section 1.1 of the *Final Long-term Monitoring Plan for Environmental Remediation Services* (LTM Plan [TolTest/MWH, March 2010]) at JOAAP.

The MFG Area, covering approximately 14 square miles (9,159 acres), is where the chemical constituents of munitions, propellants, and explosives were produced. The production facilities were generally located in the northern half of the MFG Area. In the southern half of the MFG Area, there was an extensive explosives storage facility. The LAP Area, covering approximately 22 square miles (14,383 acres), is where munitions were loaded, assembled, and packaged for shipping. The LAP Area contained munitions filling and assembly lines, storage areas, and a demilitarization area.

Joliet Army Ammunition Plant was constructed during World War II. The production output varied with the demand for munitions. Although the plant was used extensively during World War II, all production of explosives halted in 1945. At that time, the sulfuric acid and ammonium nitrate plants were leased out, and the remaining production facilities were put in layaway status. The installation was reactivated during the Korean War, and again during the Vietnam War. Production gradually decreased until it was stopped completely in 1977.

Hazardous wastes were generated and released into the environment in several ways. Process waters used in the production and handling of 2,4,6-trinitrotoluene (TNT) and other compounds were discharged into drainage systems. Buildings and equipment were periodically washed to remove explosive residues. Most of these wastewaters leached into the ground or flowed into local surface water and creeks. Later, process water incineration or industrial wastewater treatment produced ash or explosives residue that accumulated over time. Ash from the incineration of production by-products was stored in landfills on-site. Equipment and demolition materials were flashed (burned) to remove residues. Fire training areas, used to keep fire and safety personnel suitably prepared, introduced contaminants to soil and groundwater. Leaks and spills occasionally occurred in the storage and handling of oils and other liquids. Wastes and unusable explosives and munitions were burned or detonated. In addition, munitions were tested, leaving some residuals in soil at the test sites. Vehicle and equipment maintenance, transformer leaks, and the handling of pesticides introduced further contamination to the soil.

Wastes generated during production activities resulted in environmental contamination at various sites around JOAAP. Because of this contamination, the United States Environmental Protection Agency (USEPA) placed the MFG Area on the National Priority List (NPL) on 21 July 1987 and the LAP Area on the NPL on 31 March 1989.

The contaminated media identified at JOAAP were divided into two operable units (OUs) to aid in the development and evaluation of remedies. The SOU consists of sites where contaminated soils, sediments, and debris were identified. The GOU consists of sites where contaminated groundwater was identified. Surface water was determined to pose no risk to health and the environment and therefore is not addressed further as a contaminated media. However, surface water discharge is a major component of the shallow groundwater system, and localized detections of explosives may occur near contaminated groundwater sites. For this reason, surface water is relevant to the GOU.

Substantial land area at JOAAP is not contaminated. Transfer activities for that land have occurred and some are still underway. After remaining potential hazards to human health and the environment are addressed under the SOU and these properties are found suitable for transfer under Public Law (PL) 104-106 and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the Army will prepare documentation for transfer.

The Illinois Land Conservation Act of 1995, PL 104-106, Div. B, Title 2901-2932, 10 February 1996, states that the Army will transfer JOAAP land to various federal, local, and state jurisdictions. Transfer of land is occurring incrementally as it is remediated and is deemed appropriate. As of 2014, the distribution of JOAAP land through these incremental transfers is approximately 17,726 acres to the United States Department of Agriculture (USDA) for establishing the Midewin National Tallgrass Prairie (MNTP); 982 acres to the Department of Veterans Affairs to establish a Veterans Cemetery; 455 acres to Will County, Illinois to establish the Will County Landfill; and 2,885 acres to the State of Illinois to establish two industrial parks.

Where groundwater contamination is present within areas to be transferred, the Army has included institutional controls (ICs) in the transfer documents to prevent exposure to contaminants, limit groundwater pumping, and to prevent manipulation of the natural groundwater flow patterns through any means. These controls will help to limit the spread of the remaining contamination in groundwater and will remain in effect with the land until removed by mutual agreement of the Army, USEPA, Illinois Environmental Protection Agency (IEPA), and the current landowner.

1.2 NATURAL ATTENUATION MECHANISMS

The selected remedial action for the GOU is remediation by natural attenuation. The following discussion provides a brief overview of the physical, chemical, and biological criteria, which are most directly linked to natural attenuation mechanisms. A more detailed assessment of the site-specific criteria used to evaluate natural attenuation at JOAAP is provided in the LTM Plan.

Aerobic and anaerobic biodegradation of explosive compounds has been previously demonstrated. There has been a significant amount of information developed on the breakdown pathways for TNT in particular. The electrophilic nature of this compound has favored reductive reactions over oxidation. Aerobic degradation pathways typically yield partially reduced nitroso and hydroxylamino compounds that form recalcitrant azoxy compounds through oxidative coupling. Anaerobic reduction of TNT follows one of two sequential pathways from either 4-amino-2,6-dinitrotoluene (4-A-2,6-DNT) or 2-amino-4,6-dinitrotoluene (2-A-4,6-DNT) to 2,6-dinitrotoluene (2,6-DNT) to 2-amino-6-nitrotoluene to 2-nitrotoluene (2-NT) to 2-aminotoluene (2-AT) to toluene. Ultimately, toluene is mineralized to carbon dioxide (CO_2) and water (H_2O). Some researchers report the end product for anaerobic degradation to be 2,4,6-triaminotoluene (TAT). The compound TAT has been reported to be highly unstable and is also irreversibly bound to soil under anaerobic and subsequent aerobic conditions.

Mineralization of toluene can occur under both aerobic and anaerobic conditions. In an aerobic environment, toluene is oxidized resulting in ring fission and subsequent rapid degradation through a series of steps where aldehydes and acids are formed. These by-products are quickly mineralized. There are at least four pathways through which toluene can be mineralized under anaerobic conditions. The anaerobic degradation of toluene typically proceeds through a series of steps resulting in the formation of alcohols, aldehydes, and acids prior to mineralization. Evidence of toluene production and subsequent mineralization is often undetected at sites because the biologically mediated reactions occur rapidly without the accumulation of by-products (Cookson, 1995).

High melting-point explosive (HMX) has been demonstrated to degrade by abiotic, anaerobic, and aerobic mechanisms. Abiotic degradation by photolysis has led to the formation of nitrate, nitrite, and formaldehyde (Gorontzy, 1994). Anaerobic degradation of HMX has led to the formation of mono-nitroso and di-nitroso derivatives and potentially can yield a small concentration of methanol. These breakdown products can be difficult if not impossible to analyze in field samples, especially in the low concentrations one would expect to find at JOAAP. Aerobic degradation of HMX can be achieved with similar breakdown products resulting (Kaplan, 1993).

Research Department Explosive (RDX) has been demonstrated to degrade by abiotic, anaerobic, and aerobic mechanisms. Abiotic degradation by photolysis has led to the formation of a mono-nitroso derivative, nitrate, nitrite, ammonium, formaldehyde, and various amides, amines, and acids. Aerobic degradation of RDX has led to the formation of mono-nitroso and di-nitroso derivatives. Anaerobic degradation of RDX can be achieved with similar breakdown products as well as tri-nitroso triazines, hydrazine, dimethylhydrazine, formaldehyde, and methanol (Gorontzy, 1994). These breakdown products can be difficult if not impossible to analyze in field samples, especially in the low concentrations one would expect to find at JOAAP.

Tri-, di-, and nitrobenzene (NB) have been demonstrated to degrade by anaerobic mechanisms. The degradation pathway can involve the formation of a nitrosobenzene compound, a hydroxylaminobenzene, and 2-aminophenol. If the system becomes aerobic, the 2-aminophenol is transformed to 2-aminomuconic semialdehyde, which can be further degraded (Haigler, 1996).

The processes affecting the natural attenuation of contaminants in groundwater are advection, dispersion, diffusion, sorption, and biodegradation. Physical attenuation processes reduce the contaminant concentrations and their overall toxicity in groundwater. Bioattenuation includes biological and chemical processes that destroy contaminant mass. Reduction in contaminant mass will eventually result in an overall decrease in concentrations and plume extent.

Proving that bioattenuation is occurring at a site is typically based on collection of site-specific information related to geologic and hydrogeologic characterization, the extent and distribution of contaminants, and the collection and analysis of specific chemical and physical attributes of the aquifer matrix and groundwater. Several investigators have developed lines of evidence which they believe can adequately demonstrate that bioattenuation is occurring at a site (Rifai et al., 1995, Wiedemeier et al., 1995, 1996).

Rifai et al. (1995) states that three indicators of MNA should be developed from the site characterization data. The three indicators are: (1) compound disappearance demonstrating the decrease in contaminant concentrations as a function of time and distance from the source; (2) loss of electron donors; and (3) presence of degradation products and the accumulation of other indicator parameters of biodegradation.

The key geologic variables with the greatest potential to impact natural attenuation are the lateral and vertical heterogeneity of each aquifer. A high degree of lateral and vertical heterogeneity within an aquifer causes varying hydraulic conductivity and hydraulic gradients. As groundwater velocities change, contaminant transport rates change; this complicates the evaluation of natural attenuation mechanisms.

Changes in contaminant concentration with time will be used to evaluate the effectiveness of natural attenuation mechanisms. If contaminant reduction does not proceed at a suitable rate, contingency options may be required. These options will be discussed on a site-specific basis.

1.3 RECORD OF DECISION REQUIREMENTS

The ROD specified general groundwater monitoring requirements. These requirements were based on information presented in the Remedial Investigation (RI) Report and did not have the additional information provided by the predesign investigation completed in 1998 or subsequent remedial actions completed at JOAAP. As such, the Army applied subsequent site data as well as historic data to arrive at site-specific LTM locations and analytes, which were included in the LTM Plan.

Based on the objectives presented in Section 1.2 of the LTM Plan and as an extension of the ROD, several types of monitoring are required for each site. These include:

- Collection of groundwater samples to evaluate contaminant concentrations;
- Collection of surface water samples where groundwater discharges to surface features to evaluate surface water contaminant concentrations;
- Collection of depth to water measurements to evaluate groundwater flow;
- Documentation and evaluation of source removal or surface disturbing activities;
- Documentation of changes in surface water features, impoundments, or conveyances; and
- Evaluation of evidence concerning illicit water withdrawal affecting contaminant migration.

1.4 LONG-TERM MONITORING PLAN

Monitoring activities are required pursuant to the decision documents developed for the various contaminated sites found at JOAAP. The LTM Plan was written to present LTM activities for the GOU and required SOU maintenance activities. The LTM Plan includes activities associated with long-term maintenance of the remedies selected for JOAAP. The objective of the LTM Plan was to provide a sufficiently detailed description of the monitoring strategy and process and to establish realistic expectations for execution of the program on the part of all stakeholders. With respect to the latter objective, it is the intent of the LTM Plan to establish both the actions to be taken in the event of various sampling outcomes and the set of conditions required to reduce and eventually discontinue long-term monitoring efforts where practicable. As such, it includes sample collection and analysis of ground and surface water, surveillance of cap maintenance and access restrictions at landfills, and surveillance of land use restrictions and other ICs implemented on an installation-wide basis.

Section 3.1 of the LTM Plan summarizes the groundwater management zones and monitoring well designations and discusses the decision tree for interpretation of groundwater quality results and the logic for optimizing site monitoring programs. Section 3.2 of the LTM Plan discusses institutional controls monitoring required as part of the MNA remedy.

The LTM program is presented in Section 4.0 of the LTM Plan which includes a discussion of site-specific monitoring programs for the GMZs and landfills, monitoring well installations, abandonments, monitoring schedules, requirements for IC monitoring, and reporting schedules. Tables A1-1 through A1-9 of Appendix A (Field Sampling Plan) of the LTM Plan provide specific information about the monitoring requirements at each site. However, it is expressly presented that the LTM program will likely change with changing conditions. Therefore, the LTM Plan tables were consolidated into a single table that is continually updated based on groundwater monitoring results and periodic reviews. The sampling completed for the third (November) and fourth (December) quarters 2014 are presented as Table 1-1 in this Report and summarizes the monitoring locations and requisite analyses for those sample locations. Additionally, the changes to the monitoring program based on results and the conditions set in the LTM Plan are summarized in Section 4 – Recommendations.

The LTM Plan provides a site-specific evaluation of the natural attenuation remedial option that is being applied to all GOU sites. The purpose of the LTM Plan is to:

- describe the process by which data will be collected and analyzed,

- determine if remedies in place at JOAAP are protective of human health and the environment,

- describe the nature of monitoring results that, if observed, would indicate further action be taken because the remedy does not appear to be sufficiently protective,

- prescribe the conditions under which certain monitoring activities may be terminated, and

- provide a detailed description of activities to monitor the GOU natural attenuation RA.

Section 5 of the LTM Plan describes reporting requirements for LTM activities. The LTM Plan reporting schedule requires the submittal of a semi-annual report which is a presentation of the results of the first and second quarterly sampling events with minimal analysis and an annual report that presents the results of the third and fourth quarterly sampling events with detailed evaluation of trends in the groundwater data. The semi-annual sampling schedule identified in the LTM Plan indicates that the sampling periods will generally be April and October of each year at all sites except Landfill M13 which is sampled quarterly, generally in January, April, July, and October of each year. In 2014, the first quarter sampling event at Landfill M13 was not conducted by Toltest prior to their bankruptcy, the second quarter sampling event was conducted in October, the third quarter sampling event (Landfill M13 only) was conducted in November, and the fourth quarter sampling event was conducted in December. Annual groundwater monitoring reports are the venue in which data are analyzed and proposed changes to the LTM Plan are presented. Acceptance of the final annual groundwater monitoring report by regulators will constitute approval of recommended changes in the monitoring program.

The LTM Plan also provides for a five-year review of the GOU natural attenuation remedy and SOU remedy, as required by the ROD. Five-year reviews are completed to evaluate the effectiveness of the GOU and SOU remedies and, if necessary, provide recommendations to modify the remedy to make it more effective. Natural attenuation data were collected during the fall 2003 sampling event to facilitate the first five-year review. The First Five-Year Review Report was completed following the fall 2003 sampling event. The Final Second Five-Year Review Reports for the GOU and SOU were submitted in August 2009. The Third Five-Year Review Report was submitted Draft Final to the USEPA in October 2014. The Third Five-Year Review Report has the GOU and SOU remedy protectiveness evaluated in one consolidated document.

1.5 HISTORICAL DATA RESULTS

Historical groundwater quality sampling results from the sampling round conducted immediately prior to completion of the individual site RA's (where available) through 2014 are presented in tabulated form in Appendix B of this Report. Specifically, Appendix B1 contains explosive compound results, Appendix B2 contains target analyte list (TAL) metals results, Appendix B3 contains inorganic indicator parameter (nitrate and sulfate) results, Appendix B4 contains volatile organic compound (VOC) results, and Appendix B5 contains semivolatile organic compound (SVOC) results. The historical tables contain data for monitoring wells that are included in the current LTM program for compounds that have been detected during groundwater monitoring activities conducted at JOAAP. These data provide the basis for evaluating concentration trends in the data and are incorporated into time vs. concentration plots to assist in the evaluation of the natural attenuation of contamination at JOAAP.

2.0 SITE ACTIVITIES

This section provides a summary of the LTM Plan requirements, the groundwater monitoring activities of the GOU, and the SOU RA landfill mowing and inspections.

2.1 LANDFILL INSPECTIONS

Post-closure monitoring requirements for Landfills L3, L11, and M13 are mandated by Illinois Administrative Code (IAC) Title 5, Subtitle G, Chapter 1, Subchapter c, Part 724, Subpart G for 15 years at Landfill M13 and 30 years at Landfills L3 and M11. The LTM Plan states that the L3 Landfill cover will be inspected quarterly; the M11 Landfill cover will be inspected quarterly for the first five years and annually for 25 years; and the M13 Landfill cover will be inspected quarterly. The inspections at Landfills L3, M11, and M13 for the third quarter were conducted in November and for the fourth quarter were conducted in December.

Landfill inspections have been conducted on a quarterly basis at Landfills L3, M11, and M13 since October 2008 in accordance with the LTM Plan. The Post-closure Landfill Inspection Report Second Quarter (October) 2014 is included as an appendix in the Draft *2014 Semi-annual Groundwater Monitoring Report* (MWH, January 2015). An inspection for the first quarter (typically conducted in January) was not completed by Toltest prior to their bankruptcy. The Post-closure Landfill Inspection Report Third Quarter (November) 2014 is included as Appendix A1 and The Post-closure Landfill Inspection Report Fourth Quarter (December) 2014 is included as Appendix A2.

From 9 through 11 December 2014, the caps at landfill Sites L3, M11, and M13 were mowed. Mowing was completed in the opposite direction as was completed in October 2014 to obtain a better cut due to long vegetation that was “laid-down” during the October mowing event. Additionally, woody vegetation growing in the rip rap was removed at Landfills M11 and M13 on 11 December. Photos of the landfill caps following mowing are included in the Post-closure Landfill Inspection Report Fourth Quarter (December) 2014 (Appendix A2).

The October 2013 landfill inspection at M11 would have completed the first five years of quarterly inspections (October 2008 through October 2013). However, since the inspection report from October 2013 was not received from Toltest prior to their bankruptcy, two additional quarterly inspections (second quarter [October] and third quarter [November]) have been conducted through 2014. In accordance with Section 4.2.2.2 of the LTM Plan, beginning in 2015 inspections at Landfill M11 will be reduced to annually (recommended during the fourth quarter). However, maintenance activities such as mowing will continue to be conducted on the same schedule as at Landfills L3 and M13.

2.2 GROUNDWATER MONITORING

This section provides a summary of the field activities undertaken to conduct third quarter (November) groundwater monitoring at Landfill M13 and fourth quarter (December) groundwater and surface water monitoring at all GOU sites. Field activities undertaken during the second quarter (October) sampling are summarized in the Draft *2014 Semi-annual Groundwater Monitoring Report* (MWH, January 2015). Site L2 was not sampled during the second quarter sampling event as recommended in the 2009 Annual Report. Site L14 was not sampled during the second quarter sampling event as recommended in the 2010 Semi-annual Report. Landfill M11 was not sampled during the second quarter sampling event as recommended in the 2011 Annual Report.

The gauging of the monitoring well groundwater elevations was accomplished using an electronic water level indicator. Depth to water was measured from a datum mark on the top of casing (TOC) of each monitoring well. All gauging measurements were taken to an accuracy of +/- 0.01 foot (ft).

In accordance with the standard operating procedure for low-flow sampling, monitoring wells were purged and sampled using low flow sampling techniques at a flow rate of approximately 100 to 250 milliliters per minute (ml/min). Dedicated ¼-inch (in.) outside diameter (OD) Teflon™ lined polyethylene tubing is installed in each monitoring well. The Teflon™ lined polyethylene tubing was connected with dedicated silicon tubing to a variable speed peristaltic pump. During purging, the pump discharge tube was attached to a Horiba™ (or equivalent) multi-probe water quality meter equipped with a flow-through cell. The water quality meters were equipped with probes for measuring field parameters including temperature, pH, specific conductivity (SpC), oxidation/reduction potential (ORP), and dissolved oxygen (DO). The water quality meters were calibrated daily in accordance with Appendix A (Field Sampling Plan) of the LTM Plan and the manufacturer's instructions.

Measurements of field parameters were taken at two-minute intervals and recorded on Groundwater/Surface Water Sampling Forms. Purging of each monitoring well was considered complete when field parameters stabilized over three successive measurements to within 10%. The last stabilization water quality readings through the flow-thru cell were used to report field parameters which are summarized in Table 2-1. Upon stabilization of the field parameters, the required samples were collected from the discharge tube of the pump into laboratory-supplied containers after disconnecting the flow-thru cell.

Samples were collected in laboratory supplied containers for explosive compounds in 500 milliliter unpreserved amber glass bottles; TAL metals in 500 milliliter, nitric acid preserved polyethylene bottles; inorganic parameters nitrate and sulfate in 250 milliliter unpreserved polyethylene bottles; VOCs in 40 milliliter, hydrochloric acid preserved glass vials; and SVOCs in one-liter unpreserved amber glass bottles. Samples collected for inorganic parameters TAL metals, nitrate, and sulfate were field filtered using high capacity 0.45 micron in-line cartridge filters. Samples were analyzed by Test America, Denver (Arvada), Colorado in general accordance with Appendix B - Quality Assurance

Project Plan (QAPP) of the LTM Plan. Due to the change in laboratories from Chicago (University Park) Illinois the QAPP is being updated with current MWH project personnel, laboratory standard operating procedures (SOPs) and key personnel from the Denver laboratory. The Draft Final *Appendix B, Quality Assurance Project Plan Update* was submitted to USEPA for review 12 February 2015.

2.2.1 Third Quarterly (November) 2014 Groundwater Monitoring

The third quarter sampling event at Landfill M13 was conducted on 18 and 19 November 2014 by MWH. MWH measured water levels at eleven monitoring wells in the vicinity of Landfill M13. A total of 7 monitoring wells were sampled at Landfill M13.

The gauging of the monitoring well water levels was accomplished using techniques discussed in Section 2.1. Groundwater elevations are summarized in Table 2-2 for the wells measured in the vicinity of Landfill M13.

Groundwater sampling was conducted in accordance with Appendix A (Field Sampling Plan) of the LTM Plan, as described above. Samples were collected from 7 monitoring wells as summarized in Table 1-1 and analyzed for VOCs, SVOCs, explosives, TAL metals, nitrate, and sulfate.

Blind duplicate samples were collected at a rate of 10% (1 per 10) for each analyte sample total. Blind duplicate M13-MW999 was collected at parent location M13-MW362 at Landfill M13 for VOCs, SVOCs, explosives, TAL metals, nitrate, and sulfate.

A matrix spike/matrix spike duplicate (MS/MSD) sample was collected from monitoring well M13-MW809.

Data was validated with 10% of the samples receiving Level IV validation. Based on the results of the validation, a data evaluation report is included in Appendix C1 and a data usability report is included in Appendix C2.

2.2.2 Fourth Quarterly (December) 2014 Groundwater Monitoring

The fourth quarter sampling event was conducted from 8 through 18 December 2014 by MWH. MWH measured water levels at a total of 144 monitoring wells and 5 surface water locations at JOAAP. A total of 39 monitoring wells and 1 surface water location were sampled at the MFG Area and 16 monitoring wells and 5 surface water locations were sampled at the LAP Area as summarized in Table 1-1.

The gauging of the monitoring well water levels was accomplished using techniques discussed in Section 2.1. Surface water elevations are determined by referencing to the known elevations of nearby benchmarks using a level and rod and from marks on existing structures (bridges) for some locations; where at others a direct measurement with a water level indicator was completed. All gauging and surveying measurements were taken to an accuracy of +/- 0.01 ft. All surface water locations contained water during gauging and sampling activities. Monitoring well MW171 at Site L1 was dry at the time water levels were measured. Groundwater elevations are summarized in Table 2-2 for the MFG and Table 2-3 for the LAP. Surface water elevations are summarized in Table 2-4. Gauging and surveying activities for individual sites were completed within a 24-hour period.

Groundwater sampling was conducted in accordance with Appendix A (Field Sampling Plan) of the LTM Plan, as described above. Surface water samples were collected by directly immersing the sample container into the surface water body to fill the bottle if filtration for TAL metals was not required. If filtration for TAL metals was required, a peristaltic pump with tubing placed directly in the surface water body was used for sample collection.

Blind duplicate samples were collected at a rate of 10% (1 per 10) for each analyte sample total. The majority of the duplicate samples were collected from monitoring wells that had previous analyte detections. Duplicate samples were collected from six monitoring wells. Details concerning field duplicates are as follows:

Duplicate Sample Number	Monitoring Point Sampled	Site	Sample Date	Analyte
MW994	MW212R	M6	12/18/2014	Explosives
MW995	MW362	M13	12/16/2014	VOCs, SVOCs, Explosives, Nitrate, and Sulfate
MW996	MW335	M11	12/11/2014	VOCs, SVOCs, Explosives, TAL Metals, Nitrate, and Sulfate
MW997	MW630	L3	12/10/2014	Explosives and TAL Metals
MW998	MW631	L3	12/10/2014	Explosives and TAL Metals
MW999	MW643	M1	12/8/2014	Sulfate

Matrix spike/matrix spike duplicate samples were collected at a rate of 5% (1 per 20) for each analyte sample total.

Data was validated with 10% of the samples receiving Level IV validation. Based on the results of the validation, a data evaluation report is included in Appendix C1 and a data usability report is included in Appendix C2.

There were no monitoring well repair activities required during the December 2014 sampling activities.

2.3 INSTITUTIONAL CONTROLS MONITORING

The remedies selected for all areas of JOAAP do not allow unrestricted use of the property or underlying groundwater. Restrictions on use of groundwater are limited to the GMZs and annual certification that the restrictions are being maintained for each GMZ is required. Land use restrictions over and above those associated with groundwater use apply wherever waste or contamination has been left in place at levels that pose an unacceptable risk without some form of ICs. Some of those areas include the three landfills (L3, M11, and M13) with associated restrictions with annual certification. For all other areas with institutional controls there is a need for similar annual certification that the deed restrictions remain in place and are effective. Annual certifications are completed separate from this report.

As mention is Section 2.2.2 of the Draft *2014 Semi-annual Groundwater Monitoring Report* (MWH, January 2015), *"During sampling, soil grading and stockpiling to build a new asphalt parking lot was observed in the northern part of Site M6."* During sampling in December the grading had been completed, base-course gravel placed, and asphalt placement was being completed. Monitoring well MW125R was located within the area asphalted. Asphalt was placed to the monitoring well and bollards and additional concrete barrier protection was provided (likely temporary during construction). Photos of the soil stockpile, asphalted lot, and monitoring well MW125R are included in Appendix D.

Additionally, between the Second and Third (October and November) quarterly sampling events the gravel lot that had been vacated to the south of Landfill M13 where flush-mount monitoring wells MW126R and MW362 are located had been asphalted. A manhole had been placed over the flush-mount well cover and the asphalt was placed to the manhole. Photos of the completed monitoring wells are included in Appendix D.

3.0 RESULTS AND RECOMMENDATIONS

Groundwater management zones are three-dimensional areas containing groundwater being managed to mitigate impairment according to IAC. The GMZs comprise both the glacial drift and shallow bedrock (Silurian Dolomite) aquifer and are bounded at depth by a confining shale unit (Maquoketa Shale). The GMZs were established with acceptance of the ROD. Any future modification of GMZ boundaries will have to be mutually agreed upon by the Army, USEPA, and IEPA. Groundwater monitoring wells and surface water collection points located inside and/or near the borders will be used to monitor contaminant plumes. Site-specific plans for GMZs for GOU sites are discussed in Sections 3.1 through 3.7.

In 2014 sampling activities were completed during the second quarter (October), third quarter (November), and fourth quarter (December) 2014. Results in this section will refer to the month collected. Toltest did not complete the first quarter sampling (typically conducted in January) at Landfill M13 prior to their bankruptcy. Samples were analyzed for one of more of the following parameters: explosive compounds, TAL metals, indicator parameters (nitrate and sulfate), VOCs, and SVOCs. Analytical results from 2014 sampling events for explosive compounds, TAL metals, indicator parameters (nitrate and sulfate), VOCs, and SVOCs are summarized in Tables 3-1 through 3-5, respectively. This section provides a site-specific presentation of the well gauging and groundwater and surface water quality sampling results. The discussions are arranged by the GMZs into which each of the sites is grouped. This provides an ability to discuss the contaminant detections in relation to each of the GMZ boundaries.

Each site in Section 3 is organized into the following subsections:

General Site Introduction: General site-specific background information is presented.

Groundwater Hydraulics: Site monitoring wells, surface water sampling locations, and water elevation measurements are presented for the water table and potentiometric surface (generally in the bedrock). For groundwater hydraulic purposes, monitoring wells are designated as overburden wells, combination overburden/bedrock wells, or bedrock wells. This designation indicates in which aquifer(s) the well is screened. When possible, discussions include the relationship between groundwater flow direction, hydraulic gradients, and contaminant migration.

Analytical Results: Figures are presented for contaminant detections observed during the October, November (M13 only), and December 2014 sampling rounds. For groundwater quality discussions, monitoring wells and surface water sampling points are designated as in-plume, early warning, or compliance points and at Landfill sites as upgradient or downgradient. These designations are included in the LTM Plan and are based on where the sampling point is located relative to historic groundwater detections, site GMZ, and/or site features.

Analytical data from 2014 sampling are included in the discussion of analytical results. Contaminant concentrations that are greater than site RGs are included in the discussion even if there is not a notable change in the analytical data for that constituent.

Method reporting limits (MRL) are generally less than site RGs. In 2014 the MRL for silver exceeded the surface water RG and the lab has been made aware of this issue. MRLs are provided for each compound in the Data Evaluation Report presented in Appendix C1. Analytical results, 'not detected' (ND) are for contaminant concentrations less than the MRL. If there were detections between the method detection limit (MDL) and the MRL, the concentration was qualified "J" as an estimated concentration (J).

Groundwater Trend Evaluation: Each annual report includes figures that show selected contaminant concentrations versus time plots to evaluate temporal trends in groundwater quality while assessing the effectiveness of natural attenuation mechanisms at each of the sites. Where possible, wells with established groundwater quality trends are displayed in chart format. For some sites, well(s) with the highest contaminant concentration greater than RGs are preferentially selected for this analysis if more than one well is available at a given site. Furthermore, within the selected wells, compounds with the greatest concentrations relative to RGs provide conservative data sets from which reduction rates are used to estimate site clean-up times. To provide as realistic as possible estimation relative to conditions since completion of the RA, data are included from immediately prior to the completion of the individual sites RA, only. This conservative measure is intended to lessen the degree the trend line is affected from historic data, as site conditions have changed due to the completion of the RAs. First order rate decay trend analyses for selected monitoring wells have been included in Appendix E. Specifically, trend plots are included in Appendix E1 and an example of the calculations completed is included as Appendix E2.

Where practical, selected compounds and monitoring wells at a particular site are used to predict contaminant reduction timeframes. The target concentration used to estimate the timeframe is the compound-specific RG. To provide an estimate of the time required for the selected explosive compounds and sulfate to naturally degrade to less than site RGs, estimates of future contamination reduction are achieved by including an exponential curve to available concentration versus time data to predict likely contaminant reduction rates (Appendix E1). The exponential curve is used to best represent trends in contaminant concentration where variations in data show no distinct trend. Presented timeframes are very approximate and assume constant contamination reduction rates for a specific compound at a specific point within the aquifer. Groundwater trend analysis results have been included in Table 3-6. Contaminant reduction likely represents all physical, chemical, and biological attenuation mechanisms active within the aquifer.

The R^2 values displayed on the plots are used for the estimated clean-up time analyses. The R^2 value is an indicator of how well the equation resulting from the regression analysis explains the relationship among the variables. An R^2 value equal to 1.0 is an exact fit, and values which approach zero suggest a very poor fit. For this analysis, R^2 values generally range between approximately 0.1 and 0.5. However, there are some R^2 values that are less than 0.1. In these cases the clean-up time analyses is unreliable. The primary cause for the low R^2 values is the seasonal variability of the concentrations. Based on the variability of the data the calculated cleanup times are only an estimate based on the data available. For additional information regarding this analysis and an example calculation for estimated clean-up times, refer to the example estimated clean-up time calculation included in Appendix E2.

Recommendations: Recommendations for each site are presented specific to the conditions of the LTM Plan. A thorough summary of recommendations is presented in Section 4.

3.1 SITE L1

Site L1 is one of six GMZs created to manage risk arising from groundwater contamination and to monitor performance of the selected remedy. Site L1 comprises 80 acres on which munitions production facilities were constructed in 1941. It is centrally located in the northern portion of the LAP Area (Figure 1-2 and Figure 3-1). Historically, Site L1 was used for demilitarization and reclamation of various munitions starting with crystallization of ammonium nitrate, but then was converted for shell renovation and 1,3,5-trinitrobenzene (TNB) recovery up until 1945. By April of 1946, it had been reactivated to reclaim TNT.

In the TNT operation, hot water was used to wash the TNT out of shells. The water was discharged to a sump where solid explosives were removed for burning and the overflow (pink water) was routed to a 4.3-acre ridge and furrow evaporation/percolation pond. By 1952, two additional evaporation ponds had been constructed southeast of the ridge and furrow unit on either side of a drainage ditch flowing from it to Prairie Creek. Prairie Creek, the surface water body draining the area, is incised into the bedrock and appears to transmit groundwater that discharges directly or emerges into the streambed by virtue of the head relief available in the open channel.

Explosive residues in soil were observed in the ridge and furrow impoundment, the western most of the two newer ponds, the area south of the washout building, and the soil around the sump. The underlying groundwater contains TNT, TNB, 2,6-DNT, and RDX both in the alluvium and in the shallow weathered bedrock, as well as degradation products from those parent compounds, as a result of the infiltration of pink water and possibly continued leaching of explosives in soil. Soil source control measures at the ridge and furrow pond were completed in March 2006. The contamination is now a legacy groundwater plume continuing to migrate to the southeast towards Prairie Creek, where it is believed to largely discharge into the creek through upwelling. Given these observations, the contaminant footprint is expected to separate from the source area over time and migrate in the alluvium and shallow bedrock until it discharges to Prairie Creek.

The overburden aquifer generally consists of a complex stratification of clay and silt, with some silty gravel observed in the eastern portion of the site near MW174. The overburden is approximately 20 ft thick in the north and less than 5 ft thick in the south and from approximately 15 ft thick in the east and 5 ft thick in the west.

3.1.1 Groundwater Hydraulics

The groundwater monitoring network at Site L1 consists of 16 monitoring wells: 8 overburden wells (MW131, MW171, MW173, MW174, MW175, MW176, MW610, and MW611), 1 combined overburden/bedrock well (MW400), and 7 bedrock wells (MW172, MW177, MW178, MW401, WES1, WES2, and WES3). Water levels are measured at the groundwater/surface water locations that are sampled (listed below), and at monitoring wells MW171, MW172, MW175, MW176, MW177, MW178, MW401, MW610, MW611 and WES2. Monitoring well MW171 was dry in December. Surface water (SW555) elevation is measured at a point along Prairie Creek. Monitoring well information and water levels for October and December are summarized in Table 2-3. The groundwater flow direction in the overburden is typically toward the southeast north of Prairie Creek and north-northwest south of Prairie Creek, and in the bedrock is typically toward the southeast as shown on Figure 3-1 and Figure 3-2, respectively. Based on groundwater flow data, Prairie Creek is the likely discharge point for all shallow groundwater in the vicinity of Site L1.

The horizontal gradient in the overburden aquifer in northern part of Site L1 was calculated to be 0.0111 feet per foot (ft/ft) for both October and December and in the southern part of Site L1 was calculated to be 0.0142 ft/ft for October and 0.0154 ft/ft for December (Table 3-7). The annual average horizontal hydraulic gradient for Site L1 was 0.0111 in the northern part of the site and was 0.0148 ft/ft in the southern part of the site. Using the reported average of 9.2E-06 centimeters per second (cm/sec) for hydraulic conductivity and an assumed porosity of 0.30, the calculated flow velocity in the overburden aquifer at Site L1 was approximately 0.001 feet per day (ft/day) or 0.4 feet per year (ft/yr) in October and December (Table 3-8).

Prairie Creek, the surface water body draining the area, is incised into the bedrock and appears to transmit groundwater that discharges directly or upwells into the streambed by virtue of the head relief available in the open channel. Vertical gradients observed between the overburden and bedrock were upward at well nest MW177/MW171 further supporting a gaining stream scenario and downward at well nests MW178/MW176 (at distance from the creek) and MW401/MW610 (on the opposite side of the creek from the site) in October. Vertical gradients observed were upward at well nests MW172/MW173 and MW401/MW610 further supporting a gaining stream scenario and downward at well nest MW178/MW176 in December (Table 3-9). Monitoring well MW171 was dry in December.

3.1.2 Analytical Results

Groundwater and surface water sampling completed for Site L1 during December are summarized in Table 1-1. The following monitoring wells and the surface water sampling location at L1 are sampled for explosives:

- In-Plume – MW131, MW173, and WES1
- Early Warning – MW174 and WES3
- Compliance – surface water sampling point SW550

Early Warning monitoring well MW172 and compliance monitoring well MW401 were removed from the sampling program beginning in April 2012.

Groundwater and surface water samples collected at Site L1 in 2014 were analyzed for explosive compounds in accordance with Appendix B (QAPP) of the LTM Plan. Explosive compound detections for 2014 sampling events conducted at Site L1 are summarized in Table 3-1 and shown on Figure 3-3. Historic explosive compound data for Site L1 are summarized in Table B1, included in Appendix B. A brief discussion of analytical results by well type follows.

In-Plume Wells (MW131, MW173, and WES1): At overburden well MW131, 2-NT was detected below the RG at a concentration of 160 micrograms per liter (µg/L) in October and not detected in December, tetryl was detected below the RG at a concentration of 2.2 µg/L in October and not detected in December, TNB exceeded the RG at concentrations of 910 µg/L in October and 2,000 µg/L in December, TNT exceeded the RG at concentrations of 1,100 µg/L in October and 1,500 µg/L in December, and 4-A-2,6-DNT was detected in October and December. There is no RG for 2-A-2,6-DNT.

At overburden well MW173, HMX was detected below the RG at concentrations of 1.5 µg/L in October and 0.67 µg/L in December, RDX exceeded the RG at a concentrations of 9 µg/L in October and 4.4 µg/L in December, TNT was detected below the RG at concentrations of 6.2 µg/L in October and 4.3 µg/L in December, and 2-A-4,6-DNT and 4-A-2,6-DNT were detected in October and December. There are no RGs for 2-A-2,6-DNT and 4-A-2,6-DNT.

At bedrock well WES1, 2-NT was detected below the RG at a concentration of 0.23 µg/L in October and not detected in December, TNB exceeded the RG at a concentration of 16 µg/L in October and was detected below the RG at a concentration of 0.27 µg/L in December, TNT exceeded the RG at a concentration of 14 µg/L in October and was detected below the RG at a concentration of 1.1 µg/L in December, and 2-A-4,6-DNT and 4-A-2,6-DNT were detected in October and December. There are no RGs for 2-A-2,6-DNT and 4-A-2,6-DNT.

Early Warning Wells (MW174 and WES3): At overburden well MW174, there were no detections for explosive compounds in October and December.

At bedrock well WES3, RDX was not detected in October and was detected below the RG at a concentration of 0.5 µg/L in December, TNT was detected below the RG at concentrations of 0.95 µg/L in October and 0.85 µg/L in December, and 2-A-4,6-DNT and 4-A-2,6-DNT were detected in October and December. There are no RGs for 2-A-2,6-DNT and 4-A-2,6-DNT.

Compliance Points (SW550): At surface water sampling location SW550, there were no detections for explosive compounds in October or December. According to the LTM Plan SW550 is to be collected at a point along Prairie Creek where the creek leaves the GMZ boundary. However, the GMZ boundary is approximately 1500 ft downstream from where groundwater emanating from the Site L1 source area would likely be discharging to the surface water. Therefore, the sample has been collected at the location shown on Figure 3-1 to provide an indication if the groundwater discharging to Prairie Creek exceeds the surface water RG. If concentrations are detected in excess of the RG at this current sampling location the sampling location will be moved downstream to the GMZ boundary to determine if surface water is leaving the GMZ in excess of the RG.

3.1.3 Groundwater Trend Evaluation

Information included in the 1998 ROD estimated the timeframe for concentrations to reach the RG at Site L1 to be 340 years, or 2338.

Data since the sampling conducted in October 2005, which was the final round conducted prior to completion of the RA, are used for this evaluation to provide a representation of site conditions since the soil source control measures were completed in 2006.

As stated in Section 4.1.1.5 (Monitoring Frequency) of the LTM Plan, "*Historical data suggest concentrations are always higher in the spring.*" and "*Should the first few years of monitoring indicate concentrations are consistently highest at a given season of the year, a change to annual monitoring during that season will be requested*." There does not appear to be consistent seasonal trends for all compounds exceeding the RG's at Site L1.

In-Plume Wells (MW131, MW173, and WES1): Groundwater trend graphs included in Appendix E1 were completed for TNT and TNB (Figure E-1 and Figure E-2, respectively) at well MW131 and were completed for RDX and TNT (Figure E-3 and Figure E-4, respectively) at well MW173. A trend graph was not completed for well WES1 due to concentrations at MW131 and MW173 being significantly higher. Therefore, their cleanup times would exceed that of well WES1. Table 3-6 summarizes the results of this analysis.

At overburden well MW131, decreasing trends are shown for TNT (Figure E-1) and TNB (Figure E-2). The estimated time at which TNT will naturally degrade to less than the RG is 271 years (2285). However, the R^2 value is very low at 0.0047 and the estimated timeframe is therefore unreliable. An increasing trend for TNT was identified in the 2013 Annual Report. The estimated time at which TNB will naturally degrade to less than the

RG is 19 years (2033) representing an increase in the estimation in the 2013 Annual Report of 2025. However, the R^2 value is very low at 0.0646 and the estimated timeframe is therefore unreliable and based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

At overburden well MW173, decreasing trends are shown for RDX (Figure E-3) and TNT (Figure E-4). The time at which RDX is estimated to naturally degrade to less than the RG is 5 years (2019) representing an increase in the estimation in the 2013 Annual Report of 2015. However, the R^2 value is low at 0.2538 and the estimated timeframe is therefore unreliable. The time at which TNT is estimated to naturally degrade to less than the RG is 5 years (2019) representing an increase in the estimation in the 2013 Annual Report of 2015. However, the R^2 value is very low at 0.0172 and the estimated timeframe is therefore unreliable. Concentrations below the RG should be observed for RDX and TNT in the near future, unless the legacy plume observed upgradient migrates to the location of MW173. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

Early Warning Wells (MW174 and WES3): At overburden well MW174, the only explosives detection was for TNT in April 2011. Therefore, there are no trends established.

At bedrock well WES3, there have been no RG exceedances, only low-level fluctuations for several explosives. Therefore, there are no trends established.

According to the LTM Plan, for an early warning point, *"if the attenuation rate constant for the best fit exponential trend line of all historic data yields a value of C > RG for three or more sequential sampling events, then there is a risk that the compliance wells will receive concentrations of COC in excess of the RG and either a better estimate of pore water velocity (i.e., a value < 16 ft/yr) is needed or additional corrective measures may need to be evaluated."* Review of the data does not indicate an increasing trend of any detected compounds in WES3, but rather low-level fluctuations below the RG. Therefore, there is no additional corrective measure evaluation required at this time.

Compliance Point (SW550): There have been no detections for explosives at surface water sampling location SW550. Therefore, there are no trends established.

According to the LTM Plan, for a compliance point, *"if Cx > RG, then additional corrective measures may be required."* There have been no detections at the compliance monitoring point. Therefore, there is no additional corrective measure evaluation required at this time.

The completion of soil source control measures in 2006 is expected to minimize contaminant loading to groundwater allowing natural attenuation mechanisms to contain and diminish groundwater RG exceedances within the GMZ. The remaining groundwater contamination at Site L1 is now a legacy plume traveling to the southeast toward Prairie

Creek. The continued presence of explosive breakdown products 2-A-4,6-DNT and 4-A-2,6-DNT (byproducts of the biodegradation of TNT) detected in samples from in-plume monitoring wells MW131, MW173, WES1 and WES3 indicates that anaerobic degradation is likely occurring within the plume. Natural attenuation mechanisms appear to be limiting the areal extent of groundwater contamination within the GMZ boundary. The estimated timeframe for TNT to reach the RG is 2285, far less time than estimated for Site L1 in the 1998 ROD of 2338.

3.1.4 Recommendations

There are no recommended changes to the sampling program at Site L1.

3.2 SITE L2

Site L2 is the second of six GMZs created to manage risk arising from groundwater contamination and to monitor performance of the selected remedy. At Site L2 the operational area covered approximately 5 acres consisting of six east-west oriented pads that are 650-ft long and 50-ft wide on which explosives and associated wastes from other production areas were burned. It is located in the central part of the LAP Area, adjacent to Prairie Creek and Kemery Lake (Figure 1-2 and Figure 3-4). Aerial photographs from 1952 also contain three north-south oriented pads to the east. The latter three pads were subsequently reconfigured into a single pad and the south oil pits were installed at their southern end. Unexploded ordnance (UXO) such as fuses and other items had been observed on the pads.

Three popping furnaces for burning small arms ammunition were located in the southwest corner of the site (Figure 3-4). Metal residues from site burning were hauled to another location. Soil removal action at the former popping furnaces was completed in 2007. A total of 7,092 cubic yards of metals contaminated soil (soil remedial unit [SRU] number 2 [SRU2]) were removed from Site L2. There were also three oil and solvent pits adjacent to the pads, covering less than a quarter acre each, in which oil was occasionally burned. The pits were remediated in 1996 as part of a removal action. At that time, UXO was encountered to the north of the pads and was also disposed.

The site is drained by Prairie Creek, two drainage ditches flowing from the north to Kemery Lake, and a gulley in the southwest corner that catches runoff from the area of the popping furnaces. While the soil around the popping furnaces was contaminated with arsenic, cadmium, and lead, those metals have not been found in the underlying groundwater and the soil has been remediated. In addition to lead and arsenic, soil around the pads contained 2,6-DNT and RDX, both of which were present in concentrations in excess of their respective RGs, and all of which were remediated in 2007.

Of the soil contaminants, only RDX has been found in the underlying groundwater at concentrations exceeding the RG. High melting-point explosive has also been observed in groundwater, but the concentrations are below the RG. Surface water samples from Prairie Creek, into which the groundwater discharges, do not contain RDX or HMX at detectable levels.

It is most likely the RDX and HMX from waste disposal activities in the northwestern corner of Site L2 were dissolved by natural precipitation and percolated into site groundwater. From there, they are being transported to Prairie Creek where they will likely emerge if they have not degraded to levels that are not detectable once dissolved in the creek. Given the soil source control measures that have taken place, the historic reduction of RDX concentrations in groundwater over the period 1991 to 2006, and the amount of time that has passed since operations ceased, it is likely that the groundwater contamination is detaching from the source area soils in the vicinity of MW404 and will move as a legacy plume.

The overburden aquifer generally consists of clay, sandy/silty clay, sand, and gravel. Gravel layers were predominantly identified near Prairie Creek (i.e. wells MW133, MW404, and MW405). The overburden thickness is irregular and generally varies between 5 and 25 ft across Site L2.

3.2.1 Groundwater Hydraulics

Site L2 is only sampled in during the fourth quarter as recommended in the 2009 Annual Groundwater Monitoring Report. Therefore, water levels were not measured and there is no hydraulic information for October.

The groundwater monitoring network at Site L2 consists of 12 monitoring wells: 5 overburden wells (MW134, MW135, MW501, MW620, and MW810), 6 combined overburden/bedrock wells (MW132, MW133, MW404, MW405, MW406, MW407), and 1 bedrock well (MW621). Water levels are measured at the groundwater/surface water locations that are sampled (listed below) and at monitoring wells MW132, MW133, MW134, MW135, MW405, MW406, and MW810. Surface water (SW550) elevation is measured at a point along Prairie Creek. Monitoring well information and water levels for December are summarized in Table 2-3. Groundwater flow direction in the overburden and bedrock aquifers is generally toward the northwest as shown on Figure 3-4 and Figure 3-5, respectively. The overburden and bedrock aquifer flow directions are consistent with flow directions observed historically. Based on groundwater flow data, Prairie Creek is the likely discharge point for all shallow groundwater in the vicinity of Site L2.

The horizontal gradient in the overburden aquifer at Site L2 was calculated to be 0.0194 ft/ft for December (Table 3-7). Using the reported average of 1.6E-03 cm/sec for hydraulic conductivity and an assumed porosity of 0.30, the flow velocity in the overburden aquifer at Site L2 was approximately 0.3 ft/day or 107 ft/yr in December (Table 3-8). At that rate, the leading edge of the plume would have already reached Prairie Creek. Research Department Explosive has not been detected in samples from downgradient wells MW620 and MW621 or surface water sampling location SW555. Given the time frame of approximately 60 years, that would mean the transport rate is less than 150 ft divided by 60 years, or 2.5 ft/yr, a rate less than the estimated hydraulic conductivity and more comparable to the rate estimated from data at Site L1.

Prairie Creek, the surface water body draining the area to the northwest, is incised into the bedrock and appears to transmit groundwater that discharges directly or upwells into the streambed by virtue of the head relief available in the open channel. An downward vertical gradient was observed between the overburden and bedrock at well nest MW621/MW620 in December (Table 3-9).

3.2.2 Analytical Results

Site L2 is only sampled in during the fourth quarter as recommended in the 2009 Annual Groundwater Monitoring Report. Therefore, there are no analytical results for October. Groundwater and surface water sampling points for Site L2 during December are summarized in Table 1-1. The following monitoring wells and surface water sampling location at L2 are sampled for explosives:

- In-Plume – MW404
- Early Warning – MW620
- Compliance – MW621 for the bedrock aquifer and surface water sampling point SW555 at a point along Prairie Creek where the creek leaves the GMZ boundary for the overburden aquifer.

Site L2 is no longer sampled during the second quarter. Therefore, there are no analytical results for October. Compliance monitoring well MW810 was removed from the sampling program beginning in October 2012.

Groundwater and surface water samples collected at Site L2 in December were analyzed for explosive compounds in accordance with Appendix B (QAPP) of the LTM Plan. Explosive compound detections for the December sampling event conducted at Site L2 are summarized in Table 3-1 and shown on Figure 3-6. Historic explosives data for Site L2 are summarized in Table B1, included in Appendix B. A brief discussion of analytical results by well type follows:

In-Plume Well (MW404): At combination well MW404, HMX was detected below the RG at a concentration of 27 ug/L and RDX exceeded the RG at a concentration of 93 µg/L.

Early Warning Well (MW620): At overburden well MW620, there were no detections for explosive compounds.

Compliance Points (MW621and SW555): At bedrock well MW621, there were no detections for explosive compounds.

At surface water sampling location SW555 in Prairie Creek, there were no detections for explosive compounds. According to the LTM Plan SW555 is to be collected at a point along Prairie Creek where the creek leaves the GMZ boundary. The sample is collected at the location shown on Figure 3-6.

3.2.3 Groundwater Trend Evaluation

Information included in the 1998 ROD estimated the timeframe for concentrations to reach the RG at Site L2 to be 20 years, or 2018.

Data since the sampling conducted in October 2006, which was the final round conducted prior to completion of the RA, are used for this evaluation to provide a representation of site conditions since the soil source control measures were completed in 2007. Additionally, since Site L2 is only sampled in the fourth quarter (fall) round due to historic data indicating that is the round with the highest concentration, only results from the fall sampling rounds are included to provide a more accurate representation of the timeframe for concentrations to reach the RG.

As stated in Section 4.1.2.6 (Monitoring Frequency) of the LTM Plan, *"If one season is found to be consistently higher than all others, a recommendation will be made to move to annual monitoring during that season."* and *"If groundwater samples collected from monitoring well MW501 do not exhibit RG exceedances for heavy metals for four consecutive quarters, the recommendation to cease monitoring will be included in the applicable semi-annual or annual groundwater monitoring report."* A change to annual monitoring in the fall was recommended in the 2010 Semi-annual Report (TolTest/MWH, 2011) which was initiated during Spring 2012.

In-Plume Well (MW404): A groundwater trend graph, included in Appendix E1, was completed for RDX (Figure E-5) at well MW404 using fourth quarter analytical results only. Table 3-6 summarizes the results of this analysis.

At combination well MW404, a decreasing trend is shown for RDX on Figure E-5. The time at which RDX is estimated to naturally degrade to less than the RG is 34 years (2048) representing an increase from the estimated time in the 2013 Annual Report of 2038. However, the R^2 value is low at 0.1461 and the estimated timeframe is therefore unreliable. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

According to the LTM Plan, for an in-plume point, *"If the best fit trend line for an exponential relationship for all monitoring data since the completion of soil source control measures has not had a rate constant < 0 for three or more sampling events and concentrations for COCs are above their respective RGs, then additional source control measures may need to be evaluated."* The location of MW404 relative to the source area, and a groundwater flow velocity of greater than 50 ft/yr, suggest the increasing concentrations from 2009 through 2012 may be the result of a spike in concentration due to soil disturbance during source control activities completed in 2007. As stated in the 2012 Annual Groundwater Monitoring Report, if the concentration of RDX did not show an indication of stabilizing by October 2013 additional source control evaluation may be required. The concentration of RDX detected in 2013 and 2014 indicted a stabilization in concentration and therefore additional source control evaluation is not necessary at this time.

Early Warning Well (MW620): At overburden well MW620, there were no detections for explosive compounds. Therefore, there are no trends established.

According to the LTM Plan, for an early warning point, *"If the attenuation rate constant for the best fit exponential trend line of all historic data yields a value of C > RG for three or more sequential sampling events, then there is a risk that the compliance wells will receive concentrations of COC in excess of the RG and either a better estimate of pore water velocity (i.e., a value < 2.8 ft/yr) is needed or additional corrective measures may need to be evaluated."* There have been no RG exceedances at MW620, only low level detections of several explosives in October 2012. Therefore, there is no additional corrective measure evaluation required at this time.

Compliance Points (MW621 and SW555): At bedrock well MW621, there were no detections for explosive compounds. Therefore, there are no trends established.

At surface water sampling location SW555, there were no detections for explosive compounds. Therefore, there are no trends established.

According to the LTM Plan, for a compliance point, *"if Cx > RG, then additional corrective measures may be required."* There were no explosive compounds detected at compliance monitoring points. Therefore, there is no additional corrective measure evaluation required at this time.

The completion of soil source control measures in 2007 is expected to minimize contaminant loading to groundwater allowing natural attenuation mechanisms to contain and diminish groundwater RG exceedances within the GMZ. The remaining groundwater contamination at Site L2 is now a legacy plume traveling to the northwest toward Prairie Creek. The estimated timeframe for RDX at monitoring well MW404 to reach the RG is 2048, 30 years longer than estimated in the 1998 ROD of 2018. However, the R^2 value is low at 0.1461 and the estimated timeframe is therefore unreliable.

3.2.4 Recommendations

There are no recommended changes to the monitoring program at Site L2.

3.3 SITE L3/ LANDFILL L3

Site L3 is the third of six GMZs created to manage risk arising from groundwater contamination and to monitor performance of the selected remedy. Site L3 comprises approximately 50 acres used as a demolition area directly southwest of Site L2. Landfill L3 (described below) occupies 3.32 acres of the Site L3 area (Figure 1-2 and Figure 3-7). Site L3 is bounded on the west by Prairie Creek, the south by an unnamed tributary of Prairie Creek, and the east by Star Grove Cemetery. Predominant use of the area was for open burning of combustibles and munitions crates, including some materials with low level explosive contamination. An air curtain destructor was constructed at the site to reduce emissions, but was never put into use. There was also a one-acre fire training area at the site, which consisted of a small depression surrounded by an earthen berm.

Specific burning units included “U” and “L” shaped burn pads and a burn cage on a concrete slab. Geophysical surveys noted a number of metallic anomalies buried around the burn pads. The soil was also found to contain lead and RDX contamination at levels requiring remediation. Berms along Prairie Creek were found to contain lead, chlordane, 2,6-DNT, and phosphate exceeding their respective RGs. It has been posited that the contamination in these berms arises from filling activity in the area when the berms were constructed. Unexploded ordnance may also be present in this area. The remedy selected for the area along Prairie Creek was consolidation and capping into what is now called Landfill L3.

Landfill L3 is located on the western edge of the Site L3 GMZ on the east bank of Prairie Creek (Figure 3-7). The area of Landfill L3 was originally contaminated through import of contaminated fill. However, other waste and contaminated soil have been moved to the Site L3 Landfill as a part of the L3 RA in order to consolidate residual contamination into a smaller footprint. Soil source control measures were completed in 2008.

Landfill L3 is believed to contain metals and explosive residues that could continue to contaminate the underlying groundwater and migrate to Prairie Creek. Because the landfill is bordered by Prairie Creek, any contamination that infiltrates from the filled area would be expected to migrate to Prairie Creek and discharge as the groundwater flows upward into the surface water body.

Monitoring at Landfill L3 is mandated by IAC Title 5, Subtitle G, Chapter 1, Subchapter c, Part 724, Subpart G for a period of 30 years.

The overburden aquifer primarily consists of silt and clay with some silty clay and sand. The overburden thickness is irregular and generally varies between approximately 5 ft and greater than 30 ft across Site L3 with limited saturated overburden in the southern part of the site.

3.3.1 Groundwater Hydraulics

The groundwater monitoring network at Site L3/Landfill L3 consists of 11 monitoring wells: 4 overburden wells (MW1, MW137, MW3, and MW410), 2 combined overburden/bedrock wells (MW136 and MW411), and 5 bedrock wells (MW412, MW630, MW631, MW632, and MW633). Water levels are measured at the groundwater/surface water locations that are sampled (listed below), and at monitoring wells MW1, MW3, MW136, MW137, MW411, and MW632. Monitoring well information and water levels for October and December are summarized in Table 2-3. The surface water elevation in the northern portion of the site is dictated by the dam located on Prairie Creek just north of Central Road (Figure 3-7). The groundwater flow direction in the overburden aquifer is generally toward the west/southwest as shown on Figure 3-7 and the groundwater flow direction in the bedrock aquifer is generally toward the west as shown on Figure 3-8. The overburden and bedrock aquifer flow directions are consistent with flow directions observed historically. Based on groundwater flow data, Prairie Creek is the likely discharge point for all shallow groundwater in the vicinity of Site L3/Landfill L3.

The horizontal gradient in the overburden at Site L3 was calculated to be 0.0305 ft/ft in October and 0.0275 ft/ft in December. The annual average horizontal gradient in the overburden aquifer at Site L3 was calculated to be 0.029 ft/ft for 2014 (Table 3-7). Using the reported average of 1.6E-03 cm/sec for hydraulic conductivity and an assumed porosity of 0.3, the flow velocity in the overburden aquifer at Site L3 was approximately 0.5 ft/day or 168 ft/yr in October and 0.4 ft/day or 152 ft/yr in December (Table 3-8).

Prairie Creek, the surface water body draining the area, is incised into the bedrock in the southern and central parts of the site and appears to transmit groundwater that discharges directly or upwells into the streambed by virtue of the head relief available in the open channel. The groundwater elevation in the bedrock at monitoring well MW632 was greater than the elevation of Prairie Creek, indicating a gaining stream scenario. Upward vertical gradients were observed in the bedrock at well nest MW631/MW630 at Site L3 in October and December (Table 3-9), further supporting a gaining stream scenario.

3.3.2 Analytical Results

Groundwater and surface water sampling points for Site L3/Landfill L3 during October and December are summarized in Table 1-1. The following monitoring wells and surface water sampling points at L3 are sampled for explosives and TAL metals:

- Upgradient – SW004 is only sampled in spring when SW555 at Site L2 is not sampled
- In-Plume – MW410 (explosives only)
- In-Plume/Downgradient –MW412
- Early Warning/Downgradient – MW630, MW631, and MW633
- Compliance/Downgradient – surface water sampling point SW777 for the overburden aquifer where the creek leaves the GMZ boundary

- Downgradient - Surface water sampling points SW557, upstream of the landfill drainage swale discharge, and SW558, at the constructed drainage swale along the southwest side of the landfill.

Upgradient monitoring well MW03 and compliance monitoring well MW632 were removed from the sampling program beginning in spring 2012.

Groundwater and surface water samples collected at Site L3/Landfill L3 in 2014 were analyzed for explosive compounds and TAL metals (except MW410) in accordance with Appendix B (QAPP) of the LTM Plan. Explosive compound detections for 2014 sampling events conducted at Site L3/Landfill L3 are summarized in Table 3-1 and shown on Figure 3-9. Metals detections for 2014 sampling events conducted at Site L3/Landfill L3 are summarized in Table 3-2. Historic explosives data for Site L3/Landfill L3 are summarized in Table B1 and for TAL metals in Table B2, included in Appendix B. For Landfill L3, the monitoring well locations are classified as upgradient or downgradient. Therefore, a single monitoring well can represent two separate classifications at Site L3/Landfill L3. A brief discussion of analytical results by well type follows:

Upgradient Point (SW004): At surface water sampling location SW004, there were no explosive compound detections or TAL metals exceedances in October. SW004 was not sampled in December when SW555 at upstream Site L2 was sampled.

In-Plume Wells (MW410 and MW412 {downgradient}): At overburden well MW410, there were no explosive compound detections in October and December.

At bedrock well MW412, HMX was detected below the RG at concentrations of 29 µg/L in October and 24 µg/L in December, RDX exceeded the RG at concentrations of 85 µg/L in both October and December, and 2-A-4,6-DNT was detected in October and December and 4-A-2,6-DNT was detected in October. There are no RGs for 2-A-2,6-DNT and 4-A-2,6-DNT. There were no RG exceedances for TAL metals in April and October.

Early Warning (downgradient) Wells (MW630, MW631 and MW633): At bedrock well MW630, HMX was detected below the RG at concentrations of 2.4 µg/L in October and 2.8 µg/L in December and RDX exceeded the RG at concentrations of 3.5 µg/L October and 5 µg/L December. There were no RG exceedances for TAL metals in October and December.

At bedrock well MW631, there were no explosive compound detections or TAL metals RG exceedances in October and December.

At bedrock well MW633, RDX exceeded the RG at concentrations of 3.8 µg/L in October and 2.9 µg/L in December. There were no TAL metals RG exceedances in October and December.

Compliance (downgradient) Point (SW777): At surface water sampling location SW777, there were no explosive compound detections or TAL metals RG exceedances in October and December.

Additional Downgradient Points (SW557 and SW558): At surface water sampling location SW557, there were no explosive compounds detected or TAL metals RG exceedances in October and December.

At surface water sampling location SW558, there were no explosive compound detections or TAL metals RG exceedances in October and December.

3.3.3 Groundwater Trend Evaluation

Information included in the 1998 ROD estimated the timeframe for concentrations to reach the RG at Site L3 to be 50 years, or 2048.

Data since the sampling conducted in May 2008, which was the final round conducted prior to completion of the RA, are used for this evaluation to provide a representation of site conditions since the soil source control measures were completed in 2008.

As stated in Section 4.1.3.5 (Monitoring Frequency) of the LTM Plan, *"Historical data suggest concentrations are always higher in the spring."* and *"Should the first few years of monitoring indicate concentrations are consistently highest at a given season of year, a changeover to annual monitoring during that season will be requested."* Additionally, Section 4.2.1.5 (Monitoring Frequency) of the LTM Plan states, *"Landfill L3 monitoring will be conducted on an semi-annual basis for a period of 30 years or until data support a successful petition to reduce frequency or terminate monitoring based on results showing no statistical difference from background conditions."* Continued semi-annual groundwater monitoring at Site L3 should provide further indication if there are seasonal trends which will allow a reduction to annual monitoring.

Upgradient Point (SW004): At surface water sampling location SW004, there have been no explosive compounds detections or TAL metal RG exceedances. Therefore, no trend has been established.

In-Plume Wells (MW410 and MW412 {downgradient}): A groundwater trend graph is included in Appendix E1 which was completed for RDX (Figure E-6) at well MW412. Table 3-6 summarizes the results of this analysis.

At overburden well MW410, there have been no recent explosives detections or TAL metals RG exceedances. Therefore, no trends have been established.

At bedrock well MW412, a decreasing trend is shown for RDX on Figure E-6. The estimated time at which RDX is estimated to naturally degrade to less than the RG is 22 years (2036) representing an increase from the estimated time in the 2013 Annual Report of

2028. However, the R^2 value is 0.551 and the estimated timeframe is therefore somewhat unreliable. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

There have been no TAL metals RG. Therefore, no trends have been established.

According to the LTM Plan, for an in-plume point, *"If the best fit trend line for an exponential relationship for all monitoring data since the completion of source control measures has not had a rate constant < 0 for three or more sampling events and concentrations for COCs are above their respective RGs, then additional source control measures need to be evaluated."* The RDX concentration at monitoring well MW412 has decreased from a high near the time of completion of landfill capping in 2008. Therefore there is no additional source control evaluation required at this time.

Early Warning (downgradient) Wells (MW630, MW631, and MW633): Groundwater trend graphs included in Appendix E1 were completed for RDX at wells MW630 (Figure E-7) and MW633 (Figure E-8). Table 3-6 summarizes the results of this analysis.

At bedrock well MW630, an increasing trend is shown for RDX on Figure E-7. Due to the increasing trend of RDX, cleanup time estimates could not be completed. However, the R^2 value is low at 0.1871 and the identified trend is therefore unreliable. The first exceedance of RDX was in April 2010, increased to a high point in April 2011, and has been decreasing since. A spike in concentration was expected after soil remediation activities were conducted in 2008 due to soil disturbance. The location of MW630, relative to the source area, the timeframe in which concentrations began to increase, and a groundwater flow velocity of approximately 140 ft/yr, suggest the RG exceedances beginning April 2010 may be the result of a spike in concentration due to soil disturbance during source control activities completed in 2008. A decreasing trend should eventually be observed for RDX as time from the soil source control measures completed in 2008 increases. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

There have been no TAL metals RG. Therefore, no trends have been established.

At bedrock well MW631, there have been no explosive compound detections or TAL metals RG exceedances. Therefore, no trends have been established.

At bedrock well MW633, a decreasing trend is shown for RDX on Figure E-8. The time at which RDX is estimated to naturally degrade to less than the RG is 8 years (2022) which is consistent with the estimate included in the 2013 Annual Report. However, the R^2 value is 0.4269 and the estimated timeframe is therefore somewhat unreliable. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

There have been no TAL metals RG. Therefore, no trends have been established.

According to the LTM Plan, for an early warning point, *"If the attenuation rate constant for the best fit exponential trend line of all historic data yields a value of C > RG for three or more sequential sampling events, then there is a risk that the compliance wells will receive concentrations of COC in excess of the RG and either a better estimate of pore water velocity (i.e., a value < 16 ft/yr) is needed or additional corrective measures may need to be evaluated."* Explosive compounds at wells MW630 indicate an increasing trend. However, the R^2 value is low at 0.1871 and the estimated timeframe is therefore unreliable. The recent increases in concentration are believed to be a result of a spike in concentration after soil remediation activities were conducted in 2008. Recent data from well MW630 indicate that concentrations have been generally declining since April 2011.

Compliance (downgradient) Point (SW777): At surface water sampling location SW777, there has been only one explosive compound detection (RDX, October 2013) and no TAL metals RG exceedances. Therefore, no trends have been established.

According to the LTM Plan, for a compliance point, "*if Cx > Background and the best fit trend line for the historic data displays no decrease for >3 years, then additional landfill measures may need to be evaluated.*" There were no RG exceedances at compliance monitoring point and SW777. Therefore, there is no additional corrective measure evaluation required at this time.

Additional Downgradient Points (SW557 and SW558): At surface water sampling location SW557, there has been only one explosive compound detection (HMX, April 2012) and no TAL metals RG exceedances. Therefore, no trends have been established.

At surface water sampling location SW558, there have been no explosive compound detections or TAL metals RG exceedances. Therefore, no trends have been established.

According to the LTM Plan, for a compliance point, "*if Cx > Background and the best fit trend line for the historic data displays no decrease for >3 years, then additional landfill measures may need to be evaluated.*" There were no RG exceedances at downgradient monitoring points SW557 or SW558. Therefore, there is no additional corrective measure evaluation required at this time.

Site L3 soil source control measures and landfill capping were completed in 2008 and are expected to minimize contaminant loading to groundwater allowing natural attenuation mechanisms to contain and diminish groundwater RG exceedances within the GMZ. Continued semi-annual groundwater monitoring at Site L3 should determine if the soil remedy (landfill capping) will diminish contaminant loading to groundwater. Prairie Creek is the likely groundwater discharge point. The estimated timeframe for RDX at monitoring well MW412 to reach the RG is 2036, 12 years less than estimated in the 1998 ROD of 2036. However, the R^2 value is low at 0.1461 and the estimated timeframe is therefore unreliable.

3.3.4 Recommendations

There are no recommended changes to the monitoring program at Site L3/Landfill L3.

The landfill cap should be mowed in 2015 as needed, at the Installation's direction. Prior to mowing, scattered woody plants observed on the landfill cap should be cut and spot treated using 2,4-D.

The Army is currently preparing the contract documentation necessary for implementation of the repairs of the rip rap along Prairie creek at Landfill L3. Field work is currently scheduled for August 2015.

3.4 SITE L14

Site L14 is the fourth of the six GMZs and comprises 33 acres in the southwestern part of the LAP area where production and storage activities were conducted (Figure 1-2 and Figure 3-10). Initially, fuses were produced at Site L14 by charging them with mercury fulminate at Building 4-14. After 1945, Building 4-14 was modified for the repackaging of smokeless powder. Based on interviews with personnel working in that area, the sump servicing Building 4-5 overflowed periodically, thereby contaminating the surrounding soil. Building 4-5 and the location of the sump are shown on Figure 3-10.

Surface soil sample results from soil samples collected near the large sump north of Building 4-5 contained both 2,4,6-TNT and RDX exceeding their respective RGs at combined levels of up to 55,000 micrograms per kilogram (µg/kg). The presence of RDX in groundwater at Site L14 resulted from percolation of the sump overflows, but additional inputs may also be the product of subsequent leaching of soil residues by natural precipitation. Concentrations declined with depth, but were measured as deep as 5 ft in the soil. A total of approximately 420 cubic yards or 546 tons of contaminated soil were removed during RA activities in 2002 and 2003. Of the two explosive compounds detected in Site L14 soil, only RDX has been observed in groundwater at concentrations in excess of its RG. The primary source is now gone, leaving only a legacy plume in the groundwater migrating to the southwest.

The overburden aquifer primarily consists of silt, clay, and silty clay, with a thin layer of silty gravel at the bedrock contact. Small pockets of sand are present in the higher, unsaturated, parts of the site. The overburden thickness is greater in the south and east (approximately 20 ft) and thins toward the north and west (approximately 10 ft).

3.4.1 Groundwater Hydraulics

Site L14 is only sampled in during the fourth quarter as recommended in the 2010 Semi-annual Groundwater Monitoring Report. Therefore, water levels were not measured and there is no hydraulic information for October.

The groundwater monitoring network at this site consists of 11 monitoring wells: 7 overburden wells (H7, H8, MW508, MW511, MW512, MW600, and MW601), 2 combined overburden/bedrock wells (MW140 and MW603, and 2 bedrock wells MW602 and MW604). Water levels are measured at the groundwater locations that are sampled (listed below), and at monitoring wells H8, MW140, MW508, MW600, MW601, MW602, MW603, and MW604. Monitoring well information and water levels are summarized in Table 2-3. The groundwater flow direction in the overburden aquifer is generally to the west/west-southwest as shown on Figure 3-10. The groundwater flow direction in the bedrock aquifer is to the west as shown on Figure 3-11. The overburden and bedrock aquifer flow directions are consistent with flow directions observed historically.

The average horizontal gradient in the overburden aquifer at Site L14 was calculated to be 0.008 ft/ft (Table 3-7). Using an average hydraulic conductivity value of 1.6E-03 cm/sec and an assumed porosity of 0.30, the flow velocity in the overburden aquifer at Site L14 was approximately 0.1 ft/day or 44 ft/yr (Table 3-8). Given the timeframe for the smokeless powder operations at Site L14, RDX would have traveled a distance of over 3,000 ft in 60 years using the measured groundwater transport rate. A review of site analytical data indicates traces of RDX just below the RG arrived at monitoring well H7 by 1999, a distance of only 460 feet. That suggests the flow velocity for RDX is more likely in the range of 10 ft/yr. A transport rate of 10 ft/yr would be consistent with the rates similarly calculated for Sites L1 and L2.

A downward vertical gradient was observed between the overburden and bedrock at well nest MW602/H7 and an upward vertical gradient was observed between the combination well and bedrock at well nest MW604/MW603 in December. Since monitoring well MW603 is a combination well the vertical gradient may not indicate the hydraulic relationship between the overburden and bedrock (Table 3-9).

3.4.2 Analytical Results

Site L14 is only sampled in during the fourth quarter as recommended in the 2010 Semi-annual Groundwater Monitoring Report. Therefore, there are no analytical results for October. Groundwater sampling points for Site L14 during December are summarized in Table 1-1. The following monitoring wells at L14 are sampled for explosives:

- In-Plume –MW511 and MW512
- Early Warning – H7

In-Plume monitoring well MW508 and compliance monitoring wells MW603 and MW604 were removed from the sampling program beginning in spring 2012.

Groundwater samples collected at Site L14 in December were analyzed for explosive compounds in accordance with Appendix B (QAPP) of the LTM Plan. Explosive compound detections for the December sampling event conducted at Site L14 are summarized in Table 3-1 and shown on Figure 3-12. Historic explosives compound data for Site L14 are summarized in Table B1, included in Appendix B. A brief discussion of analytical results by well type follows:

In-Plume Wells (MW511 and MW512): At overburden well MW511, HMX was detected below the RG at a concentration of 24 µg/L and RDX exceeded the RG at a concentration of 160 µg/L.

At overburden well MW512, HMX was detected below the RG at a concentration of 36 µg/L, RDX exceeded the RG at a concentration of 86 µg/L, and 2-A-4,6-DNT and 4-A-2,6-DNT were detected. There are no RGs for 2-A-4,6-DNT and 4-A-2,6-DNT.

Early Warning Well (H7): At overburden well H7, there were no explosive compounds detected in December.

3.4.3 Groundwater Trend Evaluation

Information included in the 1998 ROD estimated the timeframe for concentrations to reach the RG at Site L14 to be 80 years, or 2078.

Data since the sampling conducted in October 2004, which was the final round conducted prior to completion of the RA, are used for this evaluation to provide a representation of site conditions since the soil source control measures were completed in 2005.

Additionally, since Site L14 is only sampled during the fourth quarter due to historic data indicating that is the round with the highest concentration, only results from the fall sampling rounds are included to provide a more accurate representation of the timeframe for concentrations to reach the RG.

As stated in Section 4.1.4.5 (Monitoring Frequency) of the LTM Plan, *"Historical data suggest concentrations are always higher in the fall."* and *"Should the first few years of monitoring indicate concentrations are consistently highest at a given season of year, a changeover to annual monitoring during that season will be requested*." A change to annual monitoring in the fall was recommended in the 2010 Semi-annual Report (TolTest/MWH, 2011) and was initiated during April 2012.

In-Plume Wells (MW511 and MW512): Groundwater trend graphs included in Appendix E1 were completed for RDX at monitoring wells MW511 (Figure E-9) and MW512 (Figure E-10) using fall analytical results only. Table 3-6 summarizes the results of this analysis.

At overburden well MW511, a decreasing trend is shown for RDX on Figure E-9. The time at which RDX is estimated to naturally degrade to less than the RG is 108 years (2122) representing an increase from the estimated time in the 2013 Annual Report of 2045. However, the R^2 value is very low at 0.0675 and the estimated timeframe is therefore unreliable. However, the calculated cleanup times are only an estimate based on the data available. The increase in concentration detected in 2014 may be anomalous and subsequent sampling will identify the significance of the increase.

At overburden well MW512, a decreasing trend is shown for RDX on Figure E-10. The time at which RDX is estimated to naturally degrade to less than the RG is 43 years (2057) which is consistent with the estimate included in the 2013 Annual Report. However, the R^2 value is low at 0.1842 and the estimated timeframe is therefore unreliable. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

According to the LTM Plan, for an in-plume point, "*if the best fit trend line for an exponential relationship for all monitoring data since the completion of source control measures has not had a rate constant < 0 for three or more sampling events and concentrations for COCs are above their respective RGs, then additional source control measures need to be evaluated*." Both MW511 and MW512 indicate a decreasing trend in concentration. Therefore there is no additional source control evaluation required at this time. Estimated cleanup times no longer includes spring data. Historically, the fall round has had the higher concentrations and therefore Site L14 is only sampled during the fall round hereafter. The elimination of the spring data should provide a more accurate estimation of the cleanup timeframe.

Early Warning Well (H7): At overburden well H7, there were have been no consistent detections. Therefore there are no trends established.

According to the LTM Plan, for an early warning point, *"if the attenuation rate constant for the best fit exponential trend line of all historic data yields a value of C > RG for three or more sequential sampling events, then there is a risk that the compliance wells will receive concentrations of COC in excess of the RG and either a better estimate of pore water velocity (i.e., a value < 10 ft/yr) is needed or additional corrective measures may need to be evaluated."* There have been no consistent detections. Therefore, there is no additional corrective measure evaluation required at this time.

The completion of soil source control measures in 2005 is expected to minimize contaminant loading to groundwater allowing natural attenuation mechanisms to contain and diminish groundwater RG exceedances within the GMZ. The remaining groundwater contamination at Site L14 is now a legacy plume traveling to the southwest. The presence of explosive breakdown products 2-A-4,6-DNT and 4-A-2,6-DNT detected in samples from well MW512 indicate that anaerobic degradation is likely occurring within the plume. These compounds are byproducts of the biodegradation of TNT. Natural attenuation mechanisms appear to be limiting the areal extent of groundwater contamination within the GMZ boundary. Upward vertical gradients (Table 3-9) in the western part of the site also likely limit the vertical migration of contaminants in the shallow bedrock aquifer. The estimated timeframe for RDX at monitoring well MW511 to reach the RG is 2122, 44 years longer than estimated in the 1998 ROD of 2078. However, the R^2 value is very low at 0.0675 and the estimated timeframe is therefore unreliable.

3.4.4 Recommendations

There are no recommended changes to the sampling program at Site L14.

3.5 SITE M1

Site M1, the southern ash pile, is part of the MFG facility (Figure 1-2 and Figure 3-13), but contains unique contaminants not present at actionable levels in any other GMZ. As such, it is singled out as the fifth of the six GMZs. Site M1 comprises 68 acres in the southwestern part of the MFG facility where, from 1965 to 1974, ash residues from the incineration of “red water” (TNT production waste water) were landfilled and piled on unlined soil. At various times (1985, 1993, and 1996) after closure, polyvinyl chloride (PVC) liner and clay were used to repair erosion damage to the cover.

Groundwater beneath and downgradient of the pile was observed to contain elevated levels of sulfate, 2,6-DNT, and antimony. The latter two exceeded their respective RGs on a single sample event only, but the sulfate has exceeded its RG continuously in groundwater and occasionally in surface water. In February 2003, the United States Army Corps of Engineers (USACE) submitted E*xplanation of Significance Difference Site M1 – Southern Ash Pile* (USACE, 2003), which expanded the northern boundary of the GMZ for Site M1 to encompass concentrations of sulfate in excess of the RG that had migrated beyond the original boundary.

The elevated sulfate is believed to originate in leachate from the Site M1 ash pile that infiltrated through the soil and entered the shallow groundwater. Dissolved sulfate then migrated to the northwest. Sulfate-containing groundwater flows into Prairie Creek, which is located northwest of the former ash pile. Concentrations of sulfate have been measured as high as 46,000 milligrams per liter (mg/L), or over 100 times the RG of 400 mg/L. As recently as 2000, surface water samples were collected that exceeded the RG of 500 mg/L. The ash piles were removed in 2006-2007 eliminating the primary source of sulfate. Consequently, dissolved sulfate in groundwater is now a legacy plume migrating to the northwest.

The overburden aquifer primarily consists of silt and clay, with scarce amounts of sand and silty gravel at the bedrock contact. Sand is abundant in the higher, unsaturated, parts of the site. Over most of Site M1, the overburden thickness is fairly consistent between 15 and 20 ft thick. At the northern end of the site, near MW642/MW641, the overburden consists entirely of silty gravel and the depth to bedrock is 29 ft. The presence of Prairie Creek in the western part of M1 suggests that Prairie Creek is the discharge point for shallow groundwater.

3.5.1 Groundwater Hydraulics

The groundwater monitoring network within this site consists of 18 monitoring wells: 7 overburden wells (MW104, MW231, MW351, MW641, MW643, MW645, and MW648), 5 combined overburden/bedrock wells (MW105, MW106, MW107, MW347, and MW649), and 6 bedrock wells (MW201, MW640, MW642, MW644, MW646, and MW647). Water levels are measured at the groundwater/surface water locations that are sampled (listed below), and at monitoring wells MW104, MW105, MW106, MW201, MW347, MW351, and MW647. Monitoring well information and water levels for October and December are summarized in Table 2-2. The groundwater flow direction in the overburden aquifer and bedrock aquifers is generally to the northwest, as shown on Figure 3-13 and Figure 3-14, respectively. The overburden and bedrock aquifer flow directions are consistent with flow directions observed historically. Based on groundwater flow data, Prairie Creek is the likely discharge point for all shallow groundwater in the vicinity of Site M1.

The horizontal gradient in the overburden aquifer in northern part of Site M1 was calculated to be 0.0385 ft/ft for October and 0.0395 ft/ft for December. The average horizontal gradient at Site M1 was 0.039 ft/ft in 2014 (Table 3-7). Using an average hydraulic conductivity value of 6.6E-05 cm/sec and an assumed porosity of 0.3, the flow velocity in the overburden aquifer at Site M1 was approximately 0.02 ft/day or 9 ft/yr in October and December (Table 3-8). However, that would indicate that the plume should be on the order of 528 ft from the ash pile after 40 years of travel time (1965 to 2005). In fact, by 2005, the elevated sulfate levels were observed out to MW645, a distance of 2,060 ft, which suggests a groundwater velocity of approximately 50 ft/yr.

Prairie Creek, the surface water body draining the area, in the northwestern part of the site appears to transmit groundwater that discharges directly or upwells into the streambed by virtue of the head relief available in the open channel. Downward vertical gradients were observed between the overburden and bedrock at well nest MW642/MW641 located at distance from Prairie Creek and upward vertical gradients were observed at well nests MW640/MW351 and MW644/MW643 and MW646/MW645 located next to Prairie Creek in October and December (Table 3-9), further supporting a gaining stream scenario.

3.5.2 Analytical Results

Groundwater sampling points for Site M1 during October and December are summarized in Table 1-1. The following monitoring wells and the surface water sampling point at M1 are sampled for sulfate:

- In-Plume – MW107, MW231, MW640, MW641, and MW642
- Early Warning –MW643 and MW644
- Compliance – MW646 for the bedrock aquifer and MW645, MW648, and MW649 and surface water sampling point SW709 where the creek leaves the GMZ boundary for the overburden aquifer.

Groundwater and surface water samples collected at Site M1 in 2014 were analyzed for sulfate in accordance with Appendix B (QAPP) of the LTM Plan. Sulfate detections for 2014 sampling events conducted at Site M1 are summarized in Table 3-3 and shown on Figure 3-15. Historic sulfate data for Site M1 are summarized in Table B3, included in Appendix B. A brief discussion of analytical results by well type follows:

In-Plume Wells (MW107, MW231, MW640, MW641, and MW642): At combination well MW107, sulfate exceeded the RG in both October and December at concentration of 16,000 mg/L.

At overburden well MW231, sulfate exceeded the RG in October and December at concentrations of 35,000 mg/L and 34,000 mg/L, respectively.

At bedrock well MW640, sulfate exceeded the RG in October and December at concentrations of 6,300 mg/L and 5,500 mg/L, respectively.

At overburden well MW641, sulfate exceeded the RG in October and December at concentrations of 690 mg/L and 650 mg/L, respectively.

At overburden well MW642, sulfate exceeded the RG in October at a concentration of 420 mg/L and was detected below the RG at a concentration of 390 mg/L in December.

Early Warning Wells (MW643 and MW644): At overburden well MW643, sulfate was detected below the RG in October and December at concentrations of 75 mg/L and 85 mg/L, respectively.

At bedrock well MW644, sulfate was detected below the RG in October and December at concentrations of 180 mg/L and 160 mg/L, respectively.

Compliance Points (MW645, MW646, MW648, MW649, and SW709): At overburden well MW645, sulfate was detected below the RG in October at a concentration of 110 mg/L and exceeded the RG in December at a concentration of 550 mg/L.

At bedrock well MW646, sulfate was detected below the RG in October at a concentration of 120 mg/L and exceeded the RG in December at a concentration of 570 mg/L.

At overburden well MW648, sulfate was detected below the RG in October and December at a concentration of 32 mg/L.

At overburden well MW649, sulfate was detected below the RG in October at a concentration of 150 mg/L and exceeded the RG in December at a concentration of 1,500 mg/L.

At surface water sampling point SW709, sulfate was detected below the RG in October and December at concentrations of 68 mg/L and 76 mg/L, respectively.

3.5.3 Groundwater Trend Evaluation

Data since the sampling conducted in April 2008, which was the final round conducted prior to completion of the RA, are used for this evaluation to provide a representation of site conditions since the soil source control measures were completed in 2008.

As stated in Section 4.1.5.5 (Monitoring Frequency) of the LTM Plan, *"If one season is found to be consistently higher than all others, a recommendation will be made to move to annual monitoring during that season."* At this point there does not appear to be any strong indication of seasonal variations. Continued monitoring will provide additional data regarding seasonal variations.

In-Plume Wells (MW107, MW231, MW640, MW641, and MW642): Groundwater trend graphs included in Appendix E1 were completed for sulfate at wells MW107 (Figure E-11), MW231 (Figure E-12), MW640 (Figure E-13), MW641 (Figure E-14), and MW642 (Figure E-15). Table 3-6 summarizes the results of this analysis.

At combination well MW107, a decreasing trend is shown for sulfate on Figure E-11. The time at which sulfate is estimated to naturally degrade to less than the RG is 61 years (2075) representing a decrease in the estimation in the 2013 Annual Report of 2141. However, the R^2 value is low at 0.1538 and the estimated timeframe is therefore unreliable. The sulfate concentration at well MW107 has been declining since spring 2009 sampling which may indicate the effect from the source control measures completed in 2008. Since dilution and dispersion are the primary attenuation mechanisms for sulfate at M1, the concentrations will likely continue to decrease with time. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

At overburden well MW231, a decreasing trend is shown for sulfate on Figure E-12. The time at which sulfate is estimated to naturally degrade to less than the RG is 419 years (2433) representing an increase from the estimated time in the 2013 Annual Report of 2264. However, the R^2 value is very low at 0.0862 and the estimated timeframe is therefore unreliable. Recent concentrations of sulfate have been relatively constant. Since dilution and dispersion are the primary attenuation mechanisms for sulfate at M1, the concentrations will likely decrease as time from the soil source control measures completed in 2008 increases. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

At bedrock well MW640, an increasing trend is shown for sulfate on Figure E-13. Due to the increasing trend of sulfate, cleanup time estimates could not be completed. However, the R^2 value is 0.4065 and the estimated timeframe is therefore somewhat unreliable. Since dilution and dispersion are the primary attenuation mechanisms for sulfate at M1, the concentrations will likely decrease as time from the soil source control measures completed in 2008 increases. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

At overburden well MW641, a decreasing trend is shown for sulfate on Figure E-14. The estimated time at which sulfate will naturally degrade to less than the RG is 28 years (2042) which is consistent with the estimation in the 2013 Annual Report. However, the R^2 value is low at 0.1732 and the estimated timeframe is therefore unreliable. Since dilution and dispersion are the primary attenuation mechanisms for sulfate at M1, the distance from the source area and the groundwater velocity of approximately 7 to 9 ft/yr would suggest that the results of the source control measures completed in 2008 have not had an effect at well MW641. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

At overburden well MW642, a decreasing trend is shown for sulfate on Figure E-15. The time at which sulfate is estimated to naturally degrade to less than the RG is 15 years (2029) representing a slight increase in the estimation in the 2013 Annual Report of 2023. However, the R^2 value is low at 0.1248 and the estimated timeframe is therefore unreliable. Since dilution and dispersion are the primary attenuation mechanisms for sulfate at M1, the distance from the source area and the groundwater velocity of approximately 7 to 9 ft/yr would suggest that the results of the source control measures completed in 2008 have not had an effect at well MW642. However, sulfate was below the RG in October 2012, October 2013, and December 2014.

According to the LTM Plan, for an in-plume point, *"if the best fit trend line for an exponential relationship for all monitoring data since the completion of source control measures has not had a rate constant < 0 for three or more sampling events and concentrations for COCs are above their respective RGs, then additional source control measures need to be evaluated."* In-plume wells with the exception of MW640 indicates decreasing concentrations and recent concentrations have been relatively stable, are lower than they have been historically, and will likely continue to decline as time from source control measures increases. Based on the location of wells MW640, MW641, and MW642 (Figure 3-15), the observed concentrations are likely the effect of migration of releases predating source control measure implementation. Based on the slow attenuation of sulfate due to dilution and dispersion being the primary attenuation mechanisms for sulfate at Site M1, the downgradient extent of groundwater exceeding the RG will likely continue to decrease in the near future. Based on the probability that these observed concentrations are the result of a legacy plume, no additional source control evaluation is recommended at this time.

Early Warning Wells (MW643 and MW644): At overburden well MW643, there were no RG exceedances and concentrations have been remaining steady.

At bedrock well MW644, there were no RG exceedances and concentrations have been remaining steady.

Section 4.1.5.6 and Table 4-6 of the LTM Plan provide maximum allowable target concentrations for sulfate at each early warning well based on a determined attenuation rate that can be used to determine if results indicate a potential future exceedance at compliance wells MW645/MW646. Although wells MW640, MW641, and MW642 were re-designated as in-plume wells, these same target concentrations are evaluated for those wells. The following table summarizes the well number, October and December 2014 analytical results in mg/L, and target concentration in mg/L. Historic analytical results are summarized in Table B3 in Appendix B.

Well Number	October Result (mg/L)	December Result (mg/L)	Target Concentration (mg/L)
MW640	6,300	5,500	6,439
MW641	690	650	1,754
MW642	420	390	1,728
MW643	75	85	438
MW644	180	160	427

This analysis shows that the concentrations from the sample collected in October and December do not exceed the LTM Plan target concentration. Therefore, this suggests, based on the determined attenuation rate at Site M1 that sulfate concentrations detected at in-plume wells MW640, MW641, and MW642 and early warning wells MW643 and MW644 are not expected to exceed the RG at the compliance points in the future. Historic sulfate concentrations are summarized on Table B3 in Appendix B.

According to the LTM Plan, for an early warning point, "*if the attenuation rate constant for the best fit exponential trend line of all historic data yields a value of C > RG for three or more sequential sampling events, then there is a risk that the compliance wells will receive concentrations of COC in excess of the RG and either a better estimate of pore water velocity (i.e., a value < 10 ft/yr) is needed or additional corrective measures may need to be evaluated*." Concentrations detected are fluctuating at low levels. Therefore, there is no additional corrective measure evaluation required at this time.

Compliance Points (MW645, MW646, MW648, MW649, and SW709): At overburden well MW645, concentrations have been recently remaining steady. The RG exceedance in December is the first exceedance detected at monitoring well MW645. Therefore there is no trend established. The increase in concentration detected in December 2014 may be anomalous and subsequent sampling will identify the significance of the increase relative to the long-term trend.
At bedrock well MW646, concentrations have been recently remaining steady. The RG exceedance in December is the first exceedance detected at monitoring well MW646. Therefore there is no trend established. The increase in concentration detected in

December 2014 may be anomalous and subsequent sampling will identify the significance of the increase relative to the long-term trend.

At overburden well MW648, there have been no RG exceedances and concentrations have been remaining steady. Therefore there is no trend established.

At overburden well MW649, concentrations have been remaining steady. The RG exceedance in December is the first exceedance detected at monitoring well MW649. Therefore there is no trend established. The increase in concentration detected in December 2014 may be anomalous and subsequent sampling will identify the significance of the increase relative to the long-term trend.

At surface water sampling location SW709, there have been no RG exceedances and concentrations have been remaining steady. Therefore there is no trend established.

According to the LTM Plan, for a compliance point, *"if Cx > RG, then additional corrective measures may be required."* Concentrations detected are fluctuating at low levels. The exceedances detected in December are suspect due to their being no previous exceedances. Future sampling will indicate if these exceedances are anomalous. Therefore, there is no additional corrective measure evaluation required at this time.

The completion of soil source control measures in 2008 is expected to minimize contaminant loading to groundwater allowing natural attenuation mechanisms to contain and diminish groundwater RG exceedances within the GMZ. The remaining groundwater contamination at Site M1 is now a legacy plume traveling to the northwest toward Prairie Creek. While sulfate can be reduced to sulfides biologically under anaerobic conditions, the process requires organic substrate to sustain the anaerobic conditions. Moreover, nitrates are reduced before sulfates. There is no evidence that sulfate reduction is occurring to any extent at Site M1. Therefore, dispersion and dilution are the primary attenuation mechanisms for sulfate at M1. Concentrations will likely continue to decrease with time. However, the migration of the legacy plume will continue to be observed to determine if dispersion and dilution are sufficient in decreasing concentrations prior to discharging to Prairie Creek.

3.5.4 Recommendations

There are no recommended changes to the sampling program at Site M1.

3.6 MFG GMZ

The MFG Area is the sixth GMZ, lies in the northwestern part of JOAAP, and was created by the consolidation of several discrete sites including M3, M4, M5, M6, M7, M8, Other Areas, and M13. The MFG Area GMZ is illustrated on Figure 1-2 and Figure 3-16. In the MFG, only Sites M6 and M13 continue to have groundwater contamination with contaminants of concern (COCs) in excess of RGs. Each site comprising the MFG GMZ will be independently closed before the MFG GMZ can be eliminated. Groundwater Closure Reports for Sites M3, M5, and M7 have been drafted and are currently in review.

3.6.1 Site M6

Site M6, the TNT Ditch Complex, covers 271 acres in the central part of the MFG Area (Figure 1-2 and Figure 3-16) and was largely used for TNT and DNT production during World War II, and then again in the Korean and Vietnam Wars. In between the wars, the facilities were used for research and development of different explosives like nitroxylenes. Production of TNT was terminated in 1977.

Production of TNT was conducted in 12 parallel lines, each containing a full sequence of production steps from the "mono-house" to the "bi-house" and then the "tri-house" buildings. Waste water ("red water") from each "tri-house" and the wash houses was discharged from wooden tanks to clay-lined ditches feeding into the TNT Ditch. In 1965, the original drainage system was replaced by wooden flumes completed in the TNT Ditch and the red water was diverted to Site M7 for treatment. Dintrotoluene production waste water was discharged from wooden tanks into open troughs and ditches that flowed to the storm water sewer system and the TNT Ditch, ultimately flowing untreated into Grant Creek. In addition to normal processing water, the TNT Ditch received drench water used to kill a production run when reactions ran out of control and posed an explosive threat. Between 1972 and 1974, there were more than 30 recorded instances of drenching with the associated discharge of "bi-oil" and concentrated nitric and sulfuric acid.

The full range of nitroaromatic compounds have historically been detected in soil at Site M6, with concentrations of TNT, 2,4-dinitrotoluene (2,4-DNT), lead, arsenic, and beryllium exceeding their respective RGs. Seven explosive compounds have historically been detected in the underlying groundwater at concentrations that exceed their respective RGs: TNT, 2,4-DNT, 2,6-DNT, 2-NT, TNB, NB, and RDX.

The overburden aquifer primarily consists of silt and clay, with variable amounts of sand and silty gravel. The overburden thickness ranges from 5 to 30 ft across the site. Based on available information, samples from overburden wells are obtained from silt and/or clay layers and discontinuous sand and gravel layers.

3.6.1.1 Groundwater Hydraulics

The groundwater monitoring network within Site M3 consists of 10 monitoring wells: 1 combined overburden/bedrock well (MW154), and 9 bedrock wells (MW111, MW112, MW113, MW203, MW232, MW233, MW348, MW352, and MW353).

The groundwater monitoring network within Site M4 consists of 3 monitoring wells: 1 combined overburden/bedrock well (MW157) and 2 bedrock wells (MW115 and MW158).

The groundwater monitoring network within Site M5 consists of 6 monitoring wells: 2 overburden wells (MW207R and MW354R), 3 combined overburden/bedrock wells (MW114R, MW127R, and MW355R), and 1 bedrock well (MW356R).

The groundwater monitoring network within Site M6 consists of 39 monitoring wells: 12 overburden wells (MW160, MW164, MW165, MW166R, MW210R, MW212R, MW307, MW309, MW650, MW652, MW662, and MW664), 3 combined overburden/bedrock wells (MW117, MW125R, and MW162R), and 24 bedrock wells (MW122, MW123R, MW208, MW209, MW213R, MW215R, MW308, MW310R, MW311, MW312, MW313, MW314, MW315, MW316, MW317, MW318, MW319, MW320R, MW651, MW653, MW654, MW655, MW663, and MW665).

The groundwater monitoring network at Site M7 consists of 7 monitoring wells: 4 overburden wells (MW156, MW216, MW660, and MW661), 1 combined overburden/bedrock well (MW159), and 2 bedrock wells (MW124R, and MW217).

The groundwater monitoring network within Site M8 consists of 9 monitoring wells: 7 overburden wells (MW121, MW147R, MW323R, MW324R, MW325R, MW328, and MW330) and 2 combined overburden/bedrock wells (MW148RR and MW327R).

The groundwater monitoring network within Other Areas consists of 3 monitoring wells: 1 combined overburden/bedrock well (MW119) and 2 bedrock wells (MW116 and MW118).

Water levels are measured at the groundwater location that are sampled and at numerous other monitoring wells. Monitoring well information and water levels are summarized in Table 2-2. The groundwater flow direction in the overburden and bedrock aquifers is generally toward the west as shown on Figure 3-16 and Figure 3-17. The overburden and bedrock aquifer flow directions are consistent with flow directions observed historically.

The horizontal gradient in the overburden aquifer in Site M6 was calculated to be 0.0186 ft/ft in the northern part and 0.0239 ft/ft in the southern part for October and 0.0182 ft/ft in the northern part and 0.0233 ft/ft in the southern part for December. The average horizontal gradient in the northern part of Site M6 was calculated to be 0.0184 ft/ft and in the southern part of Site M6 was calculated to be 0.0236 ft/ft. The horizontal gradient at Site M7 was calculated to be 0.0099 ft/ft in October and 0.0094 ft/ft in December. The average horizontal gradient at Site M7 was calculated to be 0.00965 ft/ft. The horizontal gradient at Site M8 was calculated to be 0.0004 ft/ft in October and 0.0002 in December. The average horizontal gradient at Site M8 was calculated to be 0.0003 ft/ft (Table 3-7).

At Site M6, using an average hydraulic conductivity value of 8.6E-04 cm/sec and an assumed porosity of 0.30, the calculated flow velocity was approximately 0.2 ft/day or 63 ft/yr in October and 0.2 ft/day or 62 ft/yr in December. However, COCs have not been detected at wells 600 ft directly downgradient (MW212R to MW123R and MW162R). Given the 60 years that have passed since releases began at Site M6, this suggests the transport time for RDX and TNT is less than 600/60 = 10 ft/yr. A rate of 10 ft/yr is comparable to transport rates calculated for other areas of JOAAP. At Site M7, using an average hydraulic conductivity value of 6.7E-04 cm/sec and an assumed porosity of 0.30, the calculated flow velocity was approximately 0.06 ft/day or 23 ft/yr in October and 0.01 ft/day or 22 ft/yr in December. At Site M8, using an average hydraulic conductivity value of 8.6E-04 cm/sec and an assumed porosity of 0.30, the calculated flow velocity was approximately 0.003 ft/day or 1.2 ft/yr in October and 0.002 ft/day or 0.6 ft/yr in December (Table 3-8).

For well nests located in the wetland on the west side of Site M6, vertical gradients observed in the bedrock at well nests MW318/MW319 and MW654/MW313 were upward in October and December and at well nest MW316/MW317 were upward in October and downward in December and at combination/bedrock well nest MW162R/MW123R vertical gradients were downward in October and December. Since monitoring well MW162R is a combination well the vertical gradient may not indicate the hydraulic relationship between the overburden and bedrock. For well nests located on the escarpment, vertical gradient observed between the overburden and bedrock at well nests MW212R/MW215R, MW210R/MW213R, MW650/MW651, MW652/MW653, MW309/MW310R, and MW307/MW308 were downward in October and December, at well nest MW166R/MW320R were upward in October and December, in the bedrock at well nest MW311/MW312 were downward in October and upward in December, and at well nest MW314/MW315 were upward in October and December (Table 3-9).

For well nests located in the vicinity of Site M7, vertical gradients observed in the overburden at Site M7 well nest MW661/MW660 were downward in October and December and at Site M4 combination/bedrock well nest MW157/MW158 were downward in October and December. Since monitoring well MW157 is a combination well the vertical gradient may not indicate the hydraulic relationship between the overburden and bedrock. Between the overburden and bedrock, upward vertical gradients were observed at Site M7 well nest MW217/MW216 were upward in October and December. (Table 3-9).

3.6.1.2 Analytical Results

Groundwater sampling points for Site M6 and other sites included in the MFG GMZ during October and December are summarized in Table 1-1. The following monitoring wells at Site M6 and other sites included in the MFG GMZ are sampled for explosives:

- In-Plume – MW212R, MW652, and MW330 (M8)
- Early Warning – MW123R, MW124R (M7), MW162R, MW313, MW318, MW319, and MW654
- Compliance – MW117 and MW118 and MW119 (Other Areas).

In-plume monitoring well MW148RR and compliance monitoring wells MW112, MW113, MW115, and MW116 were removed from the sampling program beginning in spring 2012.

Groundwater samples collected at Site M6 and other sites included in the MFG GMZ in 2014 were analyzed for explosive compounds in accordance with Appendix B (QAPP) of the LTM Plan. Monitoring well MW330 was sampled for sulfate. Explosive compound detections for 2014 sampling events conducted at Site M6 and other sites included in the MFG GMZ are summarized in Table 3-1 and shown on Figure 3-18. Sulfate detections for 2014 sampling events conducted at Site M8 are summarized in Table 3-3 and shown on Figure 3-18. Historic explosives and sulfate data for Site M6 and other sites included in the MFG GMZ are summarized in Tables B1 and B3, respectively, included in Appendix B. A brief discussion of analytical results by well type follows:

In-Plume Wells (MW212R, MW652, and MW330): At overburden well MW212R, 1,3-dinitrobenzene (DNB) was detected below the RG at a concentration of 1.5 µg/L in October and was not detected in December (the MRL was elevated above the RG due to dilution), 2,4-DNT exceeded the RG at concentrations of 620 µg/L in October and 5,800 µg/L in December, 2,6-DNT exceeded the RG at concentrations of 300 µg/L in October and 1,500 µg/L in December, NB was detected below the RG at a concentration of 1.6 µg/L in October and was not detected in December (the MRL was elevated above the RG due to dilution), 2-NT was detected below the RG at a concentration of 1,800 µg/L in October and exceeded the RG at a concentration of 22,000 µg/L in December, RDX was not detected in October and December (the MRL was elevated above the RG due to dilution in December), TNB was not detected in October and exceeded the RG at a concentration of 8.4 µg/L in December, TNT exceeded the RG at concentrations of 60 µg/L in October and 940 µg/L in December, 3-NT and 4-NT, were detected in October and December, and 2-A-4,6-DNT, and 4-A-2,6-DNT were detected in October but were not detected in December. However, there was an increased detection limit due to dilution in December. There are no RGs for 3-NT, 4-NT, 2-A-4,6-DNT, and 4-A-2,6-DNT.

At overburden well MW652, DNB was exceeded the RG in at a concentration of 14 µg/L in October was detected below the RG at a concentration of 7.8 µg/L in December, 2,4-DNT exceeded the RG at concentrations of 5,100 µg/L in October and 4,700 µg/L in December, 2,6-DNT exceeded the RG at concentrations of 3,000 µg/L in October and 1,800 µg/L in December, NB was detected below the RG at concentrations of 27 µg/L in October and 17 µg/L in December, 2-NT exceeded the RG at concentrations of 17,000 µg/L in October and 19,000 µg/L in December, the MRL for TNB was elevated above the RG due to dilution in October and December, TNT exceeded the RG at concentrations of 1,200 µg/L in October and 610 µg/L in December, and 3-NT, 4-NT, 2-A-4,6-DNT, and 4-A-2,6-DNT were detected in October and December. There are no RGs for 3-NT, 4-NT, 2-A-4,6-DNT, and 4-A-2,6-DNT.

At overburden well MW330, sulfate exceeded the RG at concentrations of 570 mg/L in October and 580 mg/L in December.

Early Warning Wells (MW123R, MW162R, MW313, MW318, MW319, and MW654): At bedrock well MW123R, there were no detections of explosive compounds in October and December.

At bedrock well MW124R, 2-NT was not detected in October and was detected below the RG at a concentration of 0.19 µg/L in December.

At overburden well MW162R, there were no detections of explosive compounds in October and December.

At bedrock well MW313, 2-NT was detected below the RG at concentrations of 0.88 µg/L in October and 0.44 µg/L in December and 4-NT was detected in October and December. There is no RG for 4-NT.

At bedrock well MW318, DNB was detected below the RG at concentrations of 1.8 µg/L in October and 1.6 µg/L in December, 2,6-DNT was not detected in October and was detected below the RG at a concentration of 0.2 µg/L in December, and 2-A-4,6-DNT was detected in December. There is no RG for 2-A-4,6-DNT.

At bedrock well MW319, NB was detected below the RG at a concentration of 0.64 µg/L in October and was not detected in December and 2-A-4,6-DNT was detected in October. There is no RG for 2-A-4,6-DNT.

At bedrock well MW654, 2-NT was not detected in October and was detected below the RG at a concentration of 0.22 µg/L in December and 2-A-4,6-DNT was detected in December. There is no RG for 2-A-4,6-DNT.

Compliance Wells (MW117 and, MW118 and MW119 (Other Areas): At combination well MW117, there were no explosive compounds detected in October and December.

At bedrock well MW118, there were no explosive compounds detected in October and December.

At bedrock well MW119 there were no explosive compounds detected in October and December.

3.6.1.3 Groundwater Trend Evaluation

Information included in the 1998 ROD estimated the timeframe for concentrations to reach the RG at the MFG to be 50 years, or 2048.

Data since the sampling conducted in October 2004 for Site M6, which was the final round conducted prior to completion of the RA, are used for this evaluation to provide a representation of site conditions since the soil source control measures were completed in 2005. At Site M8, the specific date for completion of the RA is unknown. Therefore data since October 2003 are used for this evaluation.

As stated in Section 4.1.7.5 (Monitoring Frequency) of the LTM Plan, *"If one season is found to be consistently higher than all other, a recommendation will be made to move to annual monitoring during that season."* Results do not indicate concentrations are consistently higher during a given season.

In-Plume Wells (MW212R, MW652, and MW330): Groundwater trend graphs included in Appendix E1 were completed for 2,4-DNT, 2,6-DNT, 2-NT, and TNT (Figures E-16 through E-19, respectively) at well MW212R, for TNT, 2,4-DNT, 2,6-DNT, and 2-NT (Figures E-20 through E-23, respectively) at well MW652, and for sulfate (Figure E-24) at well MW330. Trend graphs for 2,4-DNT, 2,6-DNT, and 2-NT at MW212R have been added due to concentrations detected and to determine their trends. Table 3-6 summarizes the results of this analysis.

At overburden well MW212R, a very slight decreasing trend is shown for 2,4-DNT on Figure E-16. The time at which 2,4-DNT is estimated to naturally degrade to less than the RG is 4835 years (6849). The 2,4-DNT trend at MW212R has not been determined in previous reports. However, the R^2 value is extremely low at 0.000008 and the identified trend is therefore very unreliable. An increasing trend is shown for 2,6-DNT on Figure E-17. Due to the increasing trend of 2,6-DNT, cleanup time estimates could not be completed. The 2,6-DNT trend at MW212R has not been determined in previous reports. However, the R^2 value is very low at 0.0008 and the identified trend is therefore very unreliable. Decreasing concentrations should eventually be observed for 2,6-DNT as time from the soil source control measures completed in 2005 increases. A decreasing trend is shown for 2-NT on Figure E-18. The time at which TNT is estimated to naturally degrade to less than the RG is 4 years (2018). The 2-NT trend at MW212R has not been determined in previous reports. However, the R^2 value is very low at 0.0317 and the identified trend is therefore unreliable. An increasing trend is shown for TNT on Figure E-19. Due to the increasing trend of TNT, cleanup time estimates could not be completed. However, the R^2 value is extremely low at 0.00008 and the identified trend is therefore very unreliable. An increasing trend for TNT was identified in the 2013 Annual Report. Decreasing concentrations should eventually be observed for TNT as time from the soil source control measures completed in 2005 increases.

At overburden well MW652, decreasing trends are shown for TNT (Figure E-20), 2,4-DNT (Figure E-21), 2,6-DNT (Figure E-22), and 2-NT (Figure E-23). The time at which TNT is estimated to naturally degrade to less than the RG is 45 years (2059) representing a decrease of the estimation in the 2013 Annual Report of 2045. However, the R^2 value is low at 0.1743 and the estimated timeframe is therefore unreliable. The time at which 2,4-DNT is estimated to naturally degrade to less than the RG is 267 years (2281) representing an increase of the estimation in the 2013 Annual Report of 2143. However, the R^2 value is very low at 0.0358 and the estimated timeframe is therefore unreliable. The time at which 2,6-DNT is estimated to naturally degrade to less than the RG is 121 years (2135) representing an increase of the estimation in the 2013 Annual Report of 2091. However, the R^2 value is very low at 0.0876 and the estimated timeframe is therefore unreliable. The time at which 2-NT is estimated to naturally degrade to less than the RG is 18 years (2032) which is consistent with the estimation in the 2013 Annual Report. However, the R^2 value is low at 0.1453 and the estimated timeframe is therefore unreliable. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available. The increase in concentration detected in 2014 may be anomalous and subsequent sampling will identify the significance of the increase relative to the long-term trend.

At overburden well MW330, an increasing trend is shown for sulfate (Figure E-24). Due to the increasing trend of sulfate, cleanup time estimates could not be completed. A deceasing trend was identified in the 2013 Annual Report estimating the timeframe to naturally degrade to less than the RG of 106 years (2119). However, the R^2 value is very low at 0.0105 and the estimated timeframe is therefore unreliable. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

According to the LTM Plan, for an in-plume point, *"If the best fit trend line for an exponential relationship for all monitoring data since the completion of source control measures has not had a rate constant < 0 for three or more sampling events and concentrations for COCs are above their respective RGs, then additional source control measures need to be evaluated."* The indicated increasing trends for 2,6-DNT and TNT at MW212R are due to elevated concentrations detected during October 2013 and December 2014 which constitutes 2 non-consecutive sampling events with an increase. The sulfate concentration at MW330 increased for 2 sampling events in April 2013 and October 2013 and then decreased in October 2014 and remained constant in December 2014. Therefore there is no additional source control evaluation required at this time.

Early Warning Wells (MW123R, MW124R, MW162R, MW313, MW318, MW319, and MW654): At bedrock well MW123R there have been no recent detections of explosive compounds. Therefore, there are no trends established.

At bedrock well MW124R, there have been no recent detections of explosive compounds. Therefore, there are no trends established.

At overburden well MW162R, there have been no recent detections of explosive compounds. Therefore, there are no trends established.

At bedrock well MW313, there have only been sporadic detections of 2,4-DNT and 2.6-DNT in 2012, RDX in 2013, and 2-NT in 2014. Therefore, there are no trends established.

At bedrock well MW318, a decreasing trend is shown for 2,6-DNT (Figure E-25). The time at which 2,6-DNT is estimated to naturally degrade to less than the RG is 9 years (2023), representing an decrease of the estimation in the 2013 Annual Report of 2042. However, the R^2 value is low at 0.1820 and the estimated timeframe is therefore unreliable. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

At bedrock well MW319, detections of explosive compounds have been low-level fluctuations. Therefore, there are no trends established.

At bedrock well MW654, detections of explosive compounds have been low-level fluctuations. Therefore, there are no trends established.

According to the LTM Plan, for an early warning point, *"If the attenuation rate constant for the best fit exponential trend line of all historic data yields a value of C > RG for three or more sequential sampling events, then there is a risk that the compliance wells will receive concentrations of COC in excess of the RG and either a better estimate of pore water velocity (i.e., a value < 10 ft/yr) is needed or additional corrective measures may need to be evaluated."* At monitoring well MW318, RG exceedances for 2,6-DNT have not been consistent, the detections are decreasing, and are likely the result of a low-level legacy plume (slug) moving through the aquifer which should attenuate as it moves further downgradient.

Compliance Wells (MW117 and MW118 and MW119 (other areas)): At combination well MW117, there have been no recent detections of explosive compounds. Therefore, there are no trends established.

At bedrock well MW118, there have been no recent consistent detections of explosive compounds. Therefore, there are no trends established.

At bedrock well MW119, there have been no recent consistent detections of explosive compounds. Therefore, there are no trends established.

According to the LTM Plan, for a compliance point, *"if Cx > RG, then additional corrective measures may be required."* Detections have been sporadic low-level fluctuations. Therefore, there is no additional corrective measure evaluation required at this time.

The completion of soil source control measures in 2005 is expected to minimize contaminant loading to groundwater, allowing natural attenuation mechanisms to contain and diminish groundwater RG exceedances within the GMZ. The remaining groundwater contamination at Site M6 is now a legacy plume traveling to the west. The presence of explosive breakdown products 2-A-4,6-DNT and 4-A-2,6-DNT, detected in samples from monitoring wells MW212R, MW652, MW318, MW319, MW654, MW124R indicate that anaerobic degradation is likely occurring within the plume. These compounds are byproducts of the biodegradation of TNT. Natural attenuation mechanisms appear to be limiting the areal extent of groundwater contamination within the GMZ boundary. . The estimated timeframe for 2,4-DNT at monitoring well MW212R to reach the RG is 6849, significantly longer than estimated in the 1998 ROD of 2048. However, the R^2 value is extremely low at 0.000008 and the estimated timeframe is therefore very unreliable.

3.6.1.4 Recommendations

Groundwater Closure Reports for Sites M3, M5, and M7 have been completed. The closure reports identify specific monitoring wells at each site recommended for abandonments. Additionally, the closure report for Site M7 recommends early warning monitoring well MW124R be removed from the LTM program. Although COCs are present in groundwater at concentrations that exceed the RGs at Site M6 and M13, based on the groundwater flow direction, it is not expected that MW124R will be impacted due to contaminant migration pathways from those sites. There are no other recommended changes to the sampling program at the MFG GMZ.

A communication was received from Trans Systems (part of CenterPoint Intermodal LLC complex) that construction work is expected to occur in the latter part of summer 2015 in the vicinity of Site M8 monitoring well MW327R. The monitoring well is not sampled as part of LTM and does not provide a critical groundwater control point. Therefore, well MW327R should be abandoned in accordance with IAC requirements.

Site M6 bedrock monitoring well MW215R should be sampled one time for explosives to determine if there has been vertical migration of the constituents detected in overburden monitoring well MW212R.

3.6.2 Landfill M13

Site M13 comprises approximately 106 acres of the central part of the MFG area known as the gravel pits. It lies north of the Tetryl Production Area, east of the TNT Ditch Complex, and west of the Acid Area (Figure 1-2 and Figure 3-16).

Landfill M13 is located in the northern part of Site M13 and comprises approximately 10.5 acres. Site features at Landfill M13 and surrounding areas are illustrated on Figure 3-19. Disposal activities were confined to four discrete areas of the site, none of which extended beyond 12 acres in size. Historical records indicate landfilling took place in the Northern Gravel Pit during the period 1966 to 1984 and involved scrap metals, creosote-treated railroad ties, telephone poles, and construction/demolition debris. Other waste management activities at Site M13 involved explosives. Explosive compounds observed in the groundwater at Site M13 include: TNT, TNB, 2,4-DNT, and 2,6-DNT.

Soil in the vicinity of the Northern Gravel Pit had been found to contain beryllium, lead, and benzo(a)pyrene as COCs. On a single occasion in 1991, antimony and cadmium were reported to be present in groundwater samples at concentrations in excess of their respective RGs, but they have not exceeded the RGs since. It is difficult to determine if the original findings could have resulted from turbid samples since low flow sampling and micro purging techniques are now employed to obtain more representative samples.

The current conceptual site model is that metal and benzo(a)pyrene in groundwater may be present as a result of leaching of waste materials in the Northern Gravel Pit. The explosives present in groundwater are far more likely to be present due to infiltration of wastewater in the TNT Ditch. There is no evidence to suggest explosive compounds were ever present in waste materials put into the pit.

The Northern Gravel Pit was consolidated and capped (Landfill M13) in 2007 to 2008. The three other pits received waste materials that do not appear to pose a threat to human health and the environment.

With the implementation of the RA on the TNT Ditch and the capping of the Northern Gravel Pit, it is anticipated that contaminants in site groundwater will detach from the source areas and migrate as legacy plumes to the west. As such, concentrations are expected to decline with time.

Monitoring at Landfill M13 is mandated by IAC Title 5, Subtitle G, Chapter 1, Subchapter c, Part 724, Subpart G for a period of 15 years.

The overburden aquifer primarily consists of silt and clay, with abundant sand and gravel in the upper, unsaturated, portion of the aquifer. The overburden thickness is approximately 25 ft and is fairly consistent across Site M13. Samples from overburden wells are obtained from silt and/or clay layers.

3.6.2.1 Groundwater Hydraulics

The groundwater monitoring network at Landfill M13 consists of 13 monitoring wells: 6 overburden wells (AEHA14R, MW126R, MW363, MW806, MW809, and MW811), 2 combined overburden/bedrock wells (MW350 and MW362), and 5 bedrock wells (MW321, MW322, MW364, MW807, and MW809). Water levels are measured at the groundwater locations that are sampled (listed below), and at monitoring wells AEHA14R, MW363, and MW364. Monitoring well information and water levels for 2014 are summarized in Table 2-2. The groundwater flow direction in the overburden aquifer for the November and December quarterly sampling events is to the south/southeast as shown on Figure 3-19 and Figure 3-20, respectively. Figure 3-20 includes the surrounding groundwater flow taken from the semi-annual sampling event in December, as shown on Figure 3-16. The groundwater flow direction in the bedrock aquifer in the immediate vicinity of Landfill M13 for November and December quarterly sampling events was generally toward the southwest as shown on Figure 3-21 and Figure 3-22. Figure 3-22 includes the surrounding groundwater flow taken from the semi-annual sampling event in December, as shown on Figure 3-17. The overburden and bedrock aquifer flow directions are consistent with flow directions observed historically.

The horizontal gradient at Site M13 was calculated to be 0.0032 ft/ft in October and 0.0028 ft/ft in both November and December. The average horizontal gradient for October, November, and December was 0.0029 ft/ft (Table 3-7). Using an average hydraulic conductivity value of 8.0E-02 cm/sec and an assumed porosity of 0.30, the calculated flow velocity at Site M13 was approximately 2.4 ft/day or 883 ft/yr in October and 2.1 ft/day or 772 ft/yr in November and December (Table 3-8).

In the overburden, upward vertical gradients were observed at downgradient well nest MW362/MW126R in October, November, and December. Between the overburden and bedrock, downward vertical gradients were observed at upgradient well nest MW807/MW806 and downgradient well nests MW809/MW808 and MW364/MW363 in October, November, and December. In the bedrock, downward vertical gradients were observed at downgradient well nest MW322/MW321 in October and December (Table 3-9).

3.6.2.2 Analytical Results

Groundwater sampling points for Landfill M13 within the MFG GMZ for the 2014 sampling events (quarterly) are summarized in Table 1-1. The following monitoring wells at Landfill M13 are sampled for VOCs, SVOCs, TAL metals, explosives, nitrate, and sulfate:

- Upgradient – MW806 and MW807
- Downgradient – MW126R, MW362, MW808, MW809, and MW811

Groundwater samples were collected at Landfill M13 in October, November, and December 2014 and were analyzed for explosive compounds, TAL metals, indicator parameters (sulfate and nitrate), VOCs, and SVOCs in accordance with Appendix B (QAPP) of the LTM Plan. Detections of explosive compounds, TAL metals, indicator parameters (sulfate and nitrate), VOCs, and SVOCs for the sampling events conducted at Landfill M13 in 2014 are summarized in Tables 3-1, 3-2, 3-3, 3-4, and 3-5, respectively. Explosive compound detections are shown on Figure 3-23. Historic analytical data for Landfill M13 are summarized in Tables B1 though B5, respectively, included in Appendix B. For Landfill M13 the monitoring well locations are classified as upgradient or downgradient locations. A brief discussion of analytical results by well type follows:

Upgradient Wells (MW806 and MW807): At overburden well MW806, there were no detections for explosive compounds, no RG exceedances for TAL metals, detections but no RG exceedances for in all quarters for nitrate and sulfate, no detections of VOCs, and no detections of SVOCs.

At bedrock well MW807, there were no detections for explosive compounds, no RG exceedances for TAL metals, nitrate was detected in December below the RG, sulfate was detected below the RG in all quarters, 1,1-dichloroethane (1,1-DCA) was detected below the RG in all quarters, cis-1,2-dichloroethene (cis-1,2-DCE) was detected below the RG in all quarters, and trichloroethene (TCE) was detected below the RG in all quarters, and no detections of SVOCs.

Downgradient Wells (MW126R, MW362, MW808, and MW809): At overburden well MW126R, there were no detections for explosive compounds, no RG exceedances for TAL metals, nitrate was detected in November below the RG, sulfate was detected below the RG in all quarters, acetone was detected in all quarters (there is no RG for acetone), and no detections of SVOCs.

At combination well MW362, 2,4-DNT exceeded the RG at concentrations of 5.7 µg/L in October, 7 µg/L in November, and 7.4 µg/L in December; 2,6-DNT attained the RG in October and exceeded the RG at a concentration of 0.52 µg/L in November and 0.6 µg/L in December; 2-NT was not detected in October and December and was detected below the RG at a concentration of 0.084 µg/L in November; and 2-A-4,6-DNT and 4-A-2,6-DNT were detected in all quarters (there are no RGs), no RG exceedances for TAL metals, nitrate was not detected, sulfate was detected below the RG in all quarters, 1,1-DCA and PCE were detected below the RG in all quarters and cis-1,2-DCE and 1,1,1-trichloroethane (1,1,1-TCA) were detected below the RG in November and December, and in the SVOC samples 2,4-DNT exceeded the RG in at a concentration of 4.3 µg/L in October, 1.8 µg/L in November, and October at a concentration of 5.4 µg/L.

At overburden well MW808, there were no detections for explosive compounds, no RG exceedances for TAL metals, nitrate was detected below the RG in October and December and sulfate was detected below the RG in all quarters, acetone was detected in October (there is no RG), and no detections of SVOCs.

At bedrock well MW809, there were no detections for explosive compounds, no RG exceedances for TAL metals, nitrate was detected below the RG in October and November and sulfate was detected below the RG in all quarters, acetone was detected in October (there is no RG), and no detections of SVOCs.

At overburden well MW811, there were no detections for explosive compounds, no RG exceedances for TAL metals, nitrate was detected below the RG in November and sulfate was detected below the RG in all quarters, benzene and 1,1-DCA were detected below the RG in November and December and toluene was detected below the RG in October, and no detections of SVOCs.

3.6.2.3 Groundwater Trend Evaluation

Data since the sampling conducted in May 2008, which was the final round conducted prior to completion of the RA, are used for this evaluation to provide a representation of site conditions since the soil source control measures were completed in 2008.

As stated in Section 4.2.3.5 (Monitoring Frequency) of the LTM Plan, "*Monitoring is required on a quarterly basis for five years, followed by ten years of semi-annual sample collection.*" Quarterly sampling through 2013 represented completion of five years of quarterly sampling and a reduction to semi-annually in 2014. However, due to the schedule, the semi-annual rounds were conducted in October and December and an additional quarterly round was completed in November.

Upgradient Wells (MW806 and MW807): At overburden well MW806, there were no detections for explosive compounds, no RG exceedances for TAL metals, detections but no RG exceedances for in all quarters for nitrate and sulfate, no detections of VOCs, and no detections of SVOCs. Therefore, there are no trends established.

At bedrock well MW807, there were no detections for explosive compounds, no RG exceedances for TAL metals, nitrate was detected in December below the RG, sulfate was detected below the RG in all quarters, 1,1-DCA was detected below the RG in all quarters, cis-1,2-DCE was detected below the RG in all quarters, and TCE was detected below the RG in all quarters, and no detections of SVOCs. Therefore, there are no trends established.

Downgradient Wells (MW126R, MW362, MW808, and MW809): A groundwater trend graph included in Appendix E1 was completed for 2,4-DNT at well MW362 (Figure E-26). Table 3-6 summarizes the results of this analysis.

At overburden well MW126R, there were no detections for explosive compounds, no RG exceedances for TAL metals, nitrate was detected in November below the RG, sulfate was detected below the RG in all quarters, acetone was detected in all quarters (there is no RG for acetone), and no detections of SVOCs. Therefore, there are no trends established.

At combination well MW362, an increasing trend is shown for 2,4-DNT on Figure E-26. Due to the increasing trend of 2,4-DNT, cleanup time estimates could not be completed. However, the R^2 value is low at 0.3651 and the identified trend is therefore unreliable. Decreasing concentrations should eventually be observed for 2,4-DNT as time from the source control measures completed in 2008 increases. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

At overburden well MW808, there were no detections for explosive compounds, no RG exceedances for TAL metals, nitrate was detected below the RG in October and December and sulfate was detected below the RG in all quarters, acetone was detected in October (there is no RG), and no detections of SVOCs. Therefore, there are no trends established.

At overburden well MW809, there were no detections for explosive compounds, no RG exceedances for TAL metals, nitrate was detected below the RG in October and November and sulfate was detected below the RG in all quarters, acetone was detected in October (there is no RG), and no detections of SVOCs. Therefore, there are no trends established.

At overburden well MW811, there were no detections for explosive compounds, no RG exceedances for TAL metals, nitrate was detected below the RG in November and sulfate was detected below the RG in all quarters, benzene and 1,1-DCA were detected below the

RG in November and December and toluene was detected below the RG in October, and no detections of SVOCs. Therefore, there are no trends established.

For the in-plume sample point, the decision rule is:

If Cx > upgradient and the best fit trend line for the historic data displays no decrease for >3 years, then additional landfill measures may need to be evaluated. Figure E-26 indicates there has been fluctuating concentrations for 2,4-DNT since October 2008 and a decrease in concentration in April and July 2013. The addition of monitoring well MW811 was an initial step in determining as horizontal extent of the 2,4-DNT and to provide a downgradient well as replacement for abandoned monitoring well AEHA15. Samples collected from monitoring well MW811 do not indicate the presence of 2,4-DNT. Based on the location of monitoring well MW811 and the direction of groundwater flow, the 2,4-DNT detected at monitoring well MW362 is not likely emanating from Landfill M13.

With respect to the landfill in-plume monitoring wells, the operative decision rules are the same for the early warning and compliance sampling points for the landfill monitoring area in which they reside. The 2,4-DNT RG exceedance at downgradient well MW362 has not been determined to be either in-plume, early warning, or compliance points. Therefore, there is no decision rule to apply to this location with exceedances.

The completion of soil source control measures in 2008 is expected to minimize contaminant loading to groundwater allowing natural attenuation mechanisms to contain and diminish groundwater RG exceedances within the GMZ by preventing precipitation from percolating through waste in the future. The presence of explosive breakdown products 2-A-4,6-DNT and 4-A-2,6-DNT detected in samples from monitoring well MW362 indicates that anaerobic degradation is likely occurring within the plume. These compounds are byproducts of the biodegradation of TNT. Natural attenuation mechanisms appear to be limiting the areal extent of groundwater contamination within the GMZ boundary.

3.6.2.4 Recommendations

- In accordance with Section 4.2.3.5 of the LTM Plan, groundwater sampling at Landfill M13 will be reduced to semi-annual and conducted along with the other semi-annual GOU sites at JOAAP.
- The landfill cap should be mowed in spring and fall 2015. Prior to mowing, scattered woody plants observed on the landfill cap should be cut and spot treated using 2,4-D.
- Although the Landfill M13 cap was mowed, the overgrowth within the Landfill M13 fenced area and surrounding the perimeter rip rap is limiting access to the landfill. Additionally, having such a dense overgrowth of seed sources in close proximity to the landfill, there will continue to be a high occurrence of invading

species. Therefore, additional mowing should be conducted surrounding the landfill, including the drainage ditch located on the south side of the landfill.

- Following mowing outside of the landfill footprint, the drainage ditch on the south side of Landfill M13 will be inspected to determine if there is blockage causing the retention of surface water.

3.7 LANDFILL M11

Landfill M11 is located in the southwestern part of the manufacturing side of JOAAP as illustrated on Figure 1-2 and Figure 3-24. The landfill monitoring area comprises approximately 133 acres. Site M11 was divided into two sections by School House Road and bordered on the west by West Patrol Road. M11 north encompassed approximately 10.5 acres of former gravel pits that were mined and filled with waste. M11 south, a former gravel pit, encompassed approximately 5.6 acres that was also mined and filled with waste. The remedy chosen for M11 was waste consolidation and capping. Implementation of the remedy was completed in 2008.

The current conceptual site model is that M11 is believed to contain manganese and sulfate containing waste that could potentially contaminate underlying groundwater and migrate beyond the GMZ.

With the implementation of the RA at Site M11, it is anticipated that the landfill cap will prevent percolation of precipitation through waste consolidated in the landfill, thus preventing groundwater contamination.

Monitoring at Landfill M11 is mandated by IAC Title 5, Subtitle G, Chapter 1, Subchapter c, Part 724, Subpart G for a period of 30 years. Long-term monitoring of the landfill cap will include quarterly inspections of the cap, vegetation, and drainage structures for the first five years, then annually for 25 years.

3.7.1 Groundwater Hydraulics

Site M11 is only sampled in during the fourth quarter as recommended in the 2011 Annual Groundwater Monitoring Report. Therefore, water levels were not measured and there is no hydraulic information for October.

The groundwater monitoring well network at Landfill M11 consists of 13 monitoring wells: 3 combination overburden/bedrock wells (MW108, MW340, and MW802) and 10 bedrock wells (MW333, MW334, MW335, MW336, MW337, MW338, MW339, MW803, MW804, and MW805). Water levels are measured at the groundwater locations that are sampled (listed below). Monitoring well information and water levels for October are summarized in Table 2-2. Bedrock is shallow at Landfill M11, ranging from 2.5 to 9 ft below ground surface. Therefore, based on the monitoring wells present, the groundwater flow maps have been revised from a water table and potentiometric to a shallow and deep potentiometric map. The groundwater flow direction in the shallow bedrock aquifer is generally toward the west as shown on Figure 3-24. The groundwater flow direction in the deep bedrock aquifer is generally toward the northwest as shown on Figure 3-25. The shallow and deep bedrock aquifer flow directions are consistent with flow directions observed historically.

The horizontal gradient in the bedrock aquifer in Site M11 was calculated to be 0.0048 ft/ft (Table 3-7). Using a hydraulic conductivity of 6.7E-04 cm/sec from nearby Site M7 and an assumed porosity of 0.30, the calculated flow velocity at Landfill M11 was approximately 0.03 ft/day or 11 ft/yr (Table 3-8).

The calculated vertical gradient between the combination well and bedrock were upward at upgradient well nest MW803/MW802 and downward in the bedrock at downgradient well nest MW805/MW804. Since monitoring well MW802 is a combination well the vertical gradient may not indicate the hydraulic relationship between the overburden and bedrock (Table 3-9).

3.7.2 Analytical Results

Site M11 is only sampled in during the fourth quarter as recommended in the 2011 Annual Groundwater Monitoring Report. Therefore, there are no analytical results for October. Groundwater sampling points for Landfill M11 during 2014 are summarized in Table 1-1. The following monitoring wells at Landfill M11 are sampled for VOCs, SVOCs, TAL metals, explosives, nitrate, and sulfate:

- Upgradient – MW802 and MW803
- Downgradient – MW333, MW334, MW335, MW336, MW804, and MW805

Groundwater sampling is no longer completed during spring.

Groundwater samples collected at Landfill M11 in 2014 and were analyzed for explosive compounds, TAL metals, indicator parameters (sulfate and nitrate), VOCs, and SVOCs in accordance with Appendix B (QAPP) of the LTM Plan. Detections for explosive compounds, TAL metals, indicator parameters (sulfate and nitrate), VOCs, and SVOCs for the sampling event conducted at Site M11 in 2014 are summarized in Tables 3-1, 3-2, 3-3, 3-4, and 3-5, respectively. Explosive compound detections are shown on Figure 3-26. Historic analytical data for Landfill M11 are summarized in Tables B1 through B5, included in Appendix B. Site M11 monitoring well locations are classified as upgradient or downgradient locations. A brief discussion of analytical results by well type follows:

Upgradient Wells (MW802 and MW803): At combination well MW802, there were no detections for explosive compounds, no RG exceedances for TAL metals, detections but no RG exceedances for nitrate and sulfate, no detections of VOCs, and no detections of SVOCs.

At bedrock well MW803, there were no detections for explosive compounds, no RG exceedances for TAL metals, detections but no RG exceedances for nitrate and sulfate, acetone was detected (there is no RG), and no detections of SVOCs.

Downgradient Wells (MW333, MW334, MW335, MW336, MW804, and MW805): At bedrock well MW333, there were no detections for explosive compounds, no RG exceedances for TAL metals, detections but no RG exceedances for nitrate and sulfate, no detections of VOCs, and no detections of SVOCs.

At bedrock well MW334, there were no detections for explosive compounds, no RG exceedances for TAL metals, detections but no RG exceedances for nitrate and sulfate, no detections of VOCs, and no detections of SVOCs.

At bedrock well MW335, there were no detections for explosive compounds, no RG exceedances for TAL metals, no detection for nitrate, sulfate exceeded the RG at a concentration of 480 mg/L, no detections of VOCs, and no detections of SVOCs.

At bedrock well MW336, there were no detections for explosive compounds, no RG exceedances for TAL metals, detections but no RG exceedances for nitrate and sulfate, acetone was detected (there is no RG), and no detections of SVOCs.

At combination well MW804, 2-A-4,6-DNT and 4-A-2,6-DNT were detected (there are no RGs), no RG exceedances for TAL metals, detections but no RG exceedances for nitrate and sulfate, no detections of VOCs, and no detections of SVOCs.

At bedrock well MW805, there were no detections for explosive compounds, no RG exceedances for TAL metals, no detection for nitrate, sulfate exceeded the RG at a concentration of 450 mg/L, acetone was detected (there is no RG), and no detections of SVOCs.

3.7.3 Groundwater Trend Evaluation

Data since the sampling conducted in May 2008, which was the final round conducted prior to completion of the RA, are used for this evaluation to provide a representation of site conditions since the soil source control measures were completed in 2008. Therefore Site M11 is only sampled in the fall round due to historic data indicating that is the round with the highest concentration, only results from the fall sampling rounds are included to provide a more accurate representation of the timeframe for concentrations to reach the RG.

As stated in Section 4.2.2.5 (Monitoring Frequency) of the LTM Plan, "*Sampling of monitoring wells at Landfill M11 is required on a semi-annual basis for a period of 30 years. If monitoring results prove to be stable and highly predictable, the installation may request a change to annual monitoring.*" Concentrations at Landfill M11 appear to be stable and predictable and sulfate is consistently declining. Therefore, Site M11 was removed from the spring sampling round beginning in 2012.

Upgradient Wells (MW802 and MW803): At combination well MW802, there were no detections for explosive compounds, no RG exceedances for TAL metals, detections but no RG exceedances for nitrate and sulfate, no detections of VOCs, and no detections of SVOCs. Therefore, there are no trends established.

At bedrock well MW803, there were no detections for explosive compounds, no RG exceedances for TAL metals, detections but no RG exceedances for nitrate and sulfate, acetone was detected (there is no RG), and no detections of SVOCs. Therefore, there are no trends established.

Downgradient Wells (MW333, MW334, MW335, MW336, MW804, and MW805): Groundwater trend graphs included in Appendix E1 were completed for sulfate at monitoring wells MW335 (Figure E-27), MW336 (Figure E-28), and MW805 (Figure E-29). Table 3-6 summarizes the results of this analysis.

At bedrock well MW335, a decreasing trend is shown for sulfate on Figure E-27. The time at which sulfate is estimated to naturally degrade to less than the RG is 5 years (2019) which is consistent with the estimate included in the 2013 Annual Report. However, the R^2 value is low at 0.1429 and the estimated timeframe is therefore unreliable. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

At bedrock well MW336, a slight increasing trend is shown for sulfate on Figure E-28. Due to the increasing trend of sulfate, cleanup time estimates for could not be completed. However, the R^2 value is extremely low at 0.0002 and the identified trend is therefore unreliable. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available. Since dilution via groundwater recharge and dispersion are the primary attenuation mechanisms for sulfate at Site M11, the concentrations will likely decrease as time from the soil source control measures completed in 2008 increases.

At bedrock well MW805, a decreasing trend is shown for sulfate on Figure E-29. The time at which sulfate is estimated to naturally degrade to less than the RG is 6 years (2020) representing a slight increase from the estimated time in the 2013 Annual Report of 2019. However, the R^2 value is low at 0.5905 and the estimated timeframe is therefore somewhat unreliable. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available.

For the in-plume sampling point, the decision rule is:
If Cx > upgradient and the best fit trend line for the historic data displays no decrease for >3 years, then additional landfill measures may need to be evaluated. At MW336 the increasing trend is due to the anomalously high detection in October 2013. The sulfate

concentration detected in December 2014 was below the RG. Sulfate in downgradient wells are declining. Therefore, additional landfill measures do not need to be evaluated at this time.

With respect to the landfill in-plume monitoring wells, the operative decision rules are the same for the early warning and compliance sample points for the landfill monitoring area in which they reside. The wells with sulfate RG exceedances at downgradient monitoring locations have not been determined to be either in-plume, early warning, or compliance points. Therefore, there is no decision rule to apply to those locations with exceedances.

The completion of soil source control measures in 2008 is expected to minimize contaminant loading to groundwater, allowing natural attenuation mechanisms to contain and diminish groundwater RG exceedances. While sulfate can be reduced to sulfides biologically under anaerobic conditions, the process requires organic substrate to sustain the anaerobic conditions. Moreover, nitrates are reduced before sulfates. There is no evidence that sulfate reduction is occurring to any extent at Site M11. Therefore, dispersion and dilution are the primary attenuation mechanisms for sulfate at M11. Concentrations will likely continue to decrease with time.

3.7.4 Recommendations

There are no recommended changes to the sampling program at M11.

The October 2013 landfill inspection at M11 would have completed the first five years of quarterly inspections (October 2008 through October 2013). According to Sections 4.2.2.2 and 4.2.2.3.2 of the LTM Plan, Landfill M11 is required to have quarterly inspections completed for the first five years, and annually thereafter. However, due to the missing inspections report from October 2013, when the landfill was mowed for the first time, quarterly inspections were continued through 2014. As stated in the Draft Final *2013 Annual Groundwater Monitoring Report* (MWH, January 2015) currently in review, *"Quarterly inspections of the landfill cap at Site M11 were required for the first five years, then annually thereafter. However, due to the missing inspections report from October 2013, when the landfill was mowed for the first time, quarterly inspections will continue through 2014."* Inspections at Landfill M11 will be reduced to annual and conducted in fall beginning in 2015. However, maintenance activities such as mowing will continue on the same schedule and Landfills L3 and M13.

The landfill cap should be mowed in spring and fall 2015. Prior to mowing, scattered woody plants observed on the landfill cap should be cut and spot treated using 2,4-D.

4.0 SUMMARY OF RECOMMENDATIONS

The following sections present a summary of recommendations made in this report that are relevant to the LTM program. A summary of the recommendations to the monitoring program, the reasoning for the recommendation, and the status of those recommendations are included in Table 4-1.

The following is a summary of recommendations:

- The monitoring program, as outlined in Table 3-10, should be implemented for 2015.
- A review of the COCs included the ROD will be conducted and compared to the current analytical lists. Any differences will be rectified.
- The hydraulic gradient and flow velocity data included in the groundwater hydraulics sections and Table 3-7 and Table 3-8 of the Report are not used in the trend evaluations. Therefore, that data will no longer be presented in the groundwater monitoring reports. Water levels used for these calculations and used to produce flow maps will continue to be measured normally. Flow maps will continue to be produced and the vertical gradient data provide useful flow information and will continue to be summarized.
- The Army is currently preparing the contract documentation necessary for implementation of the repairs of the rip rap along Prairie creek at Landfill L3. Field work is currently scheduled for August 2015.
- The landfill caps should be mowed in 2015 as needed, at the Installation's direction. Prior to mowing, scattered woody plants observed on the landfill caps should be cut and spot treated using 2,4-D.
- Site M6 bedrock monitoring well MW215R should be sampled one time for explosives to determine if there has been vertical migration of the constituents detected in overburden monitoring well MW212R.
- Site M7 early warning monitoring well MW124R should be removed from the LTM program in accordance with the groundwater closure report for Site M7.
- A communication was received from Trans Systems (part of CenterPoint Intermodal LLC complex) that construction work is expected to occur in the latter part of summer 2015 in the vicinity of Site M8 monitoring well MW327R. The monitoring well is not sampled as part of LTM and does not provide a critical groundwater control point. Therefore, well MW327R should be abandoned in accordance with IAC requirements.
- In accordance with Section 4.2.3.5 of the LTM Plan, groundwater sampling at Landfill M13 will be reduced to semi-annual.
- Additional mowing should be conducted surrounding Landfill M13, including the drainage ditch located on the south side of the landfill.

- Following mowing outside of the landfill footprint, the drainage ditch on the south side of Landfill M13 will be inspected to determine if there is blockage causing the retention of surface water.
- In accordance with Section 4.2.3.5 of the LTM Plan, 4.2.2.2 and 4.2.2.3.2, inspections at Landfill M11 will be reduced to annual beginning in 2015. Inspection will be conducted in fall. However, maintenance activities such as mowing will continue on the same schedule and Landfills L3 and M13.

5.0 REFERENCES

Aerostar Environmental Services, Inc. 2009. *Second Five-Year Review Report for the Soil Operable Unit, Joliet Army Ammunition Plant*, prepared for the U.S. Army Corps of Engineers, Louisville District, Louisville, Kentucky, August 2009.

Cookson, John T., 1995. Bioremediation Engineering: Design and Application, McGraw-Hill, Inc.

Gorontzy, T., O. Drzyzga, M.W. Kahl, D. Bruns-Nagel, J. Breitung, E. von Loew, and K.H. Blotevogel, 1994. Microbial Degradation of Explosives and Related Compounds in Critical Reviews in Microbiology, 20(4), CRC Press, Boca Raton, FL.

Haigler, B.E. and J.C. Spain, 1996. Degradation of Nitroaromatic Compounds by Microbes in the Society for Industrial Microbiology News, 46(2), Society for Industrial Microbiology, Fairfax, VA.

Kaplan, D.L., 1993. Biotechnology and Bioremediation in Organic Energetic Compounds, ed. Paul L. Marinkas, Nova Science Publishers, NY, NY.

MWH/USACE, 2014. Draft *Third Five Year Review Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, October 2014.

MWH, 2015. Final *2013 Annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, May 2015.

MWH, 2015. Final 2*014 Semi-annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, June 2015.

Rifai, H.S., Borden, R.C., Wilson, J.T. and C.H. Ward. 1995. *Intrinsic Bioattenuation for Subsurface Restoration.* In: Intrinsic Bioremediation, ed. R.E. Hinchee, J.T. Wilson, and D.C. Downey, 1-29. Columbus, OH: Battelle Press.

TolTest/MWH, 2010. *Final Long-term Monitoring Plan for Environmental Remediation Services, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, March 2010.

TolTest/MWH, 2011. *Final 2009 Semi-annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, September 2011.

TolTest/MWH, 2011. *Final 2009 Annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, September 2011.

TolTest/MWH, 2011. *Final 2010 Semi-annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, December 2011.

TolTest/MWH, 2012. *Final 2010 Annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, May 2012.

TolTest/MWH, 2012. *Final 2011 Semi-annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, June 2012.

TolTest/MWH, 2013. *Final 2011 Annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, January 2013.

TolTest/MWH, 2013. *Final 2012 Semi-annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, April 2013.

TolTest/MWH, 2013. *Final 2012 Annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, October 2013.

TolTest/MWH, 2014. *Final 2013 Semi-annual Groundwater Monitoring Report, Joliet Army Ammunition Plant, Wilmington, IL,* prepared for United States Army Environmental Command, Aberdeen Proving Ground, MD, April 2014.

U.S. Army, 1998. *Final Record of Decision for the Soil and Groundwater Operable Units on the Manufacturing and Load-Assemble-Package Areas, National Priority List Sites*, *Joliet Army Ammunition Plant*, *Wilmington*, *Will County*, *Illinois*, October 1998.

Wiedemeier, T.H., 1995. *Technical Protocol for Implementing Intrinsic Remediation with Long-term Monitoring for Natural Attenuation of Fuel Contamination Dissolved in Groundwater*, Vol. I and II, prepared for Air Force Center for Environmental Excellence, Technology Transfer Division, Brooks Air Force Base, San Antonio, Texas.

Wiedemeier, T.H., Swanson, M.A., Moutoux, D.E., Wilson, J.T. Kampbell, D.H., Hansen, J.E., and P. Haas, 1996. *Overview of the Technical Protocol for Natural Attenuation of Chlorinated Aliphatic Hydrocarbons in Ground Water Under Development for the U.S. Air Force Center for Environmental Excellence.* In: U.S. EPA Symposium on Natural Attenuation of Chlorinated Organics in Ground Water. EPA/540/R-96/509. Washington, DC.

TABLES

Table 1-1

Sample Parameters - 3rd and 4th Quarters 2014
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well ID	Parameter
L1	***In-plume***	
	MW131	E
	MW173	E
	WES1	E
	Early Warning	
	WES3	E
	MW174	E
	Compliance	
	SW550	E
L2	***In-plume***	
	MW404	E
	Early Warning	
	MW620	E
	Compliance	
	MW621	E
	SW555	E
L3/ Landfill L3	***Upgradient***	
	SW0004	E, M
	In-plume/Downgradient	
	MW410	E
	MW412	E, M
	Early Warning/Downgradient	
	MW630	E, M
	MW631	E, M
	MW633	E, M
	Compliance/Downgradient	
	SW777	E, M
	Downgradient	
	SW557	E, M
	SW558	E, M
L14	***In-plume***	
	MW511	E
	MW512	E
	Early Warning	
	H7	E
M1	***In-plume***	
	MW107	S
	MW231	S
	MW640	S
	MW641	S
	MW642	S
	Early Warning	
	MW643	S
	MW644	S
	Compliance	
	MW645	S
	MW646	S
	MW648	S
	MW649	S
	SW709	S

Table 1-1

Sample Parameters - 3rd and 4th Quarters 2014
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well ID	Parameter
MFG	***In-plume***	
	MW212R	E
	MW330	S
	MW652	E
	Early Warning	
	MW123R	E
	MW124R	E
	MW162R	E
	MW313	E
	MW318	E
	MW319	E
	MW654	E
	Compliance	
	MW117	E
	MW118	E
	MW119	E
Landfill M13(1)	***Upgradient***	
	MW806	E, I, M, SVOC & V
	MW807	E, I, M, SVOC & V
	Downgradient	
	MW126R	E, I, M, SVOC & V
	MW362	E, I, M, SVOC & V
	MW808	E, I, M, SVOC & V
	MW809	E, I, M, SVOC & V
	MW811	E, I, M, SVOC & V
Landfill M11	***Upgradient***	
	MW802	E, I, M, SVOC & V
	MW803	E, I, M, SVOC & V
	Downgradient	
	MW333	E, I, M, SVOC & V
	MW334	E, I, M, SVOC & V
	MW335	E, I, M, SVOC & V
	MW336	E, I, M, SVOC & V
	MW804	E, I, M, SVOC & V
	MW805	E, I, M, SVOC & V

General Notes:
E = Explosives
M = Target Analyte List Metals
S = Sulfate
MFG = Manufacturing Area
I = Indicator parameters (Nitrate-N and Sulfate)
SVOC = Semivolatile organic compounds
V = Volatile Organic Compounds (VOCs)

Footnotes:
(1) Site M13 Landfill monitoring wells were also sampled during the 3rd Quarter in November for these parameters in compliance with Illinois Administrative Code.

Table 2-1

Summary of Final Field Parameters
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well ID	Sample Date	pH (SU)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)
L1	**In-plume**							
	MW131	10/28/2014	6.91	999	0.0	6.34	10.9	137
		12/9/2014	6.85	1110	29.1	4.02	11.2	103
	MW173	10/27/2014	7.24	690	0.0	1.84	13.2	-72
		12/9/2014	6.93	1030	31.4	1.51	10.0	-43
	WES1	10/28/2014	8.36	1020	0.0	2.63	10.2	137
		12/9/2014	8.03	1040	1.5	1.61	9.3	-42
	Early Warning							
	WES3	10/27/2014	7.83	938	0.0	2.58	11.2	138
		12/9/2014	8.00	1120	0.0	2.73	7.4	141
	MW174	10/28/2014	7.15	767	0.0	3.29	12.4	103
		12/9/2014	8.11	1120	0.0	3.55	9.9	132
	Compliance							
	SW550	10/28/2014	7.88	717	6.0	11.11	13.3	102
		12/9/2014	7.89	1120	36.0	20.40	3.0	127
L2(1)	**In-plume**							
	MW404	12/10/2014	8.00	993	5.8	4.76	8.0	143
	Early Warning							
	MW620	12/10/2014	7.11	671	45.8	0.76	9.2	-82
	Compliance							
	MW621	12/10/2014	8.25	870	0.0	5.51	9.7	160
	SW555	12/10/2014	8	742	32.3	9.36	4.9	181
L3	**Upgradient**							
	SW004(2)	10/23/2014	9.59	972	13.2	12.14	8.5	14
	In-plume							
	MW410	10/23/2014	8.50	1090	1.3	0.63	11.6	-117
		12/10/2014	7.01	848	57.9	0.30	11.9	-126
	In-plume/Downgradient							
	MW412	10/23/2014	7.24	705	0.0	5.28	12.5	99
		12/10/2014	8.81	1020	3.5	7.44	8.3	163
	Early Warning/Downgradient							
	MW630	10/23/2014	7.35	690	0.3	2.89	13.4	-44
		12/10/2014	8.17	1010	1.2	3.50	9.2	122
	MW631	10/23/2014	8.57	788	0.0	2.46	11.9	-73
		12/10/2014	7.29	668	31.0	2.74	11.0	-3
	MW633	10/23/2014	8.66	802	16.1	7.23	13.3	45
		12/10/2014	7.33	673	56.3	6.88	10.2	57
	Compliance/Downgradient							
	SW777	10/23/2014	8.38	707	2.8	12.27	11.2	68
		12/10/2014	8.19	752	39.7	12.56	3.7	6
	Downgradient							
	SW557	10/23/2014	9.25	924	7.1	13.12	9.5	42
		12/10/2014	8.14	759	36.4	13.99	3.6	23
	SW558	10/23/2014	9.03	838	1.1	12.96	9.6	73
		12/10/2014	8.20	680	33.1	13.54	3.3	17
L14(1)	**In-plume**							
	MW511	12/9/2014	8.25	962	1.2	6.51	8.8	141
	MW512	12/9/2014	8.08	835	3.1	2.60	11.4	127
	Early Warning							
	H7	12/9/2014	7.28	603	43.9	11.16	10.1	93

Table 2-1

Summary of Final Field Parameters
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well ID	Sample Date	pH (SU)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)
M1	**In-plume**							
	MW107	10/28/2014	10.66	4060	0.0	2.43	12.2	22
		12/8/2014	9.94	3840	0.0	1.43	10.6	-28
	MW231	10/28/2014	10.65	4060	0.0	2.63	12.2	22
		12/8/2014	10.00	7280	0.0	1.16	10.0	-277
	MW640	10/28/2014	6.80	8830	0.0	1.63	12.0	-71
		12/8/2014	6.66	9300	28.9	0.50	11.1	-76
	MW641	10/29/2014	7.21	1950	1.9	1.41	14.4	-90
		12/8/2014	7.05	1990	31.2	0.54	13.1	-113
	MW642	10/29/2014	7.26	1400	0.5	2.28	12.3	-116
		12/8/2014	8.37	2030	0.0	2.48	10.4	-111
	Early Warning							
	MW643	10/28/2014	7.10	763	0.9	2.87	13.5	-90
		12/8/2014	7.00	803	34.5	1.67	9.8	-105
	MW644	10/28/2014	7.34	943	0.0	1.78	12.8	29
		12/8/2014	8.43	1320	0.0	7.08	10.3	49
	Compliance							
	MW645	10/27/2014	8.14	1300	0.0	8.67	14.5	108
		12/8/2014	7.27	981	28.4	8.41	10.1	-3
	MW646	10/27/2014	7.40	821	0.0	2.09	13.4	10
		12/8/2014	8.62	1170	0.0	6.07	10.6	7
	MW648	10/28/2014	8.53	755	0.0	2.13	14.3	-107
		12/8/2014	7.20	619	62.7	0.58	12.0	-61
	MW649	10/28/2014	8.28	866	0.0	1.89	13.8	78
		12/8/2014	7.20	886	30.4	7.41	11.3	37
	SW709	10/28/2014	8.34	695	0.0	13.07	14.6	41
		12/8/2014	8.73	1060	0.6	16.65	2.7	82
MFG	**In-plume**							
	MW212R	10/22/2014	7.33	674	1.4	1.79	12.8	-64
		12/18/2014	7.00	2	600.0	8.90	11.1	78
	MW330	10/20/2014	7.72	2090	6.5	5.91	13.2	190
		12/16/2014	6.94	1530	32.2	4.29	11.2	76
	MW652	10/22/2014	7.05	974	0.0	1.49	12.4	-57
		12/18/2014	6.94	1140	53.9	0.99	11.0	77
	Early Warning							
	MW123R	10/21/2014	8.11	1470	20.3	1.48	12.8	-124
		12/17/2014	6.93	1170	38.1	2.41	11.6	-51
	MW124R	10/21/2014	8.17	900	49.4	1.46	13.2	-93
		12/17/2014	7.00	701	400.0	0.57	10.4	-83
	MW162R	10/21/2014	7.15	794	0.1	4.89	14.8	78
		12/17/2014	8.08	1190	0.0	6.97	6.6	177
	MW313	10/22/2014	7.31	1430	0.0	1.54	11.5	-250
		12/18/2014	7.23	1470	37.6	1.21	11.0	-203
	MW318	10/21/2014	7.01	1070	0.0	1.72	12.6	-178
		12/17/2014	7.98	1550	0.0	1.73	10.6	-169
	MW319	10/21/2014	8.43	1680	131.0	17.24	13.0	-157
		12/17/2014	7.32	1330	34.4	0.88	11.8	1
	MW654	10/22/2014	8.26	1940	6.9	3.17	12.6	-249
		12/18/2014	7.87	2360	0.9	1.34	10.2	-287
	Compliance							
	MW117	10/27/2014	7.39	1220	2.5	2.50	14.1	-58
		12/15/2014	7.34	1390	32.6	5.06	10.0	51
	MW118	10/27/2014	7.46	601	0.0	2.54	13.9	74
		12/15/2014	8.27	880	0.0	4.08	10.2	135
	MW119	10/27/2014	8.38	2430	3.4	2.84	14.0	57
		12/17/2014	7.03	1770	46.6	1.29	8.7	73

Table 2-1

Summary of Final Field Parameters
2014 Annual Groundwater Monitoring Report
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Will County, Illinois

Site	Well ID	Sample Date	pH (SU)	Specific Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (°C)	Redox (mV)
Landfill M13	Upgradient							
	MW806	10/21/2014	8.54	931	1.8	1.80	12.2	-119
		11/19/2014	7.56	774	15.3	0.00	12.1	35
		12/16/2014	8.71	1050	0.0	1.63	11.5	65
	MW807	10/21/2014	7.04	4	0.5	1.64	12.3	-124
		11/19/2014	7.20	4650	34.4	0.00	11.1	-112
		12/16/2014	6.98	4400	29.3	1.35	12.5	-87
	Downgradient							
	MW126R	10/21/2014	8.26	908	0.0	2.10	14.0	-24
		11/19/2014	7.22	795	16.2	0.74	13.2	133
		12/16/2014	7.90	1050	0.0	5.44	12.8	142
	MW362	10/21/2014	7.06	2900	0.0	1.70	12.5	104
		11/19/2014	7.21	3390	15.7	0.00	11.4	103
		12/16/2014	7.05	3300	29.1	3.62	12.5	59
	MW808	10/20/2014	6.47	1730	1.8	2.60	12.1	122
		11/18/2014	6.80	1720	14.3	0.00	11.0	130
		12/15/2014	6.63	1630	29.9	0.74	12.2	46
	MW809	10/20/2014	7.54	623	0.0	2.34	12.2	68
		11/18/2014	7.92	515	13.5	0.00	10.7	-16
		12/15/2014	8.58	704	0.0	2.25	10.3	134
	MW811(3)	10/29/2014	NA	NA	NA	NA	NA	NA
		11/19/2014	NA	NA	NA	NA	NA	NA
		12/16/2014	NA	NA	NA	NA	NA	NA
Landfill M11(1)	Upgradient							
	MW802	12/11/2014	7.91	1570	0.0	4.26	8.2	34
	MW803	12/15/2014	7.59	736	26.4	2.88	10.7	71
	Downgradient							
	MW333	12/15/2014	8.74	930	0.0	7.69	9.5	135
	MW334	12/15/2014	7.32	956	27.4	0.94	10.6	-166
	MW336	12/11/2014	8.08	1960	1.5	1.57	9.6	-175
	MW804	12/11/2014	7.09	1180	36.7	1.52	9.7	-4
	MW805	12/11/2014	8.24	2060	2.5	1.28	9.3	-190
	MW335	12/11/2014	7.36	1750	34.4	0.79	10.0	-175

General Notes:
ID = Identification
SU = Standard Units
mS/cm = Microsiemens Per Centimeter
NTU = Nephelometric Turbidity Unit
mg/L = Milligrams Per Liter
°C = Degrees Centigrade
mV = Millivolt
R = Replacement Well
Redox = Reduction/Oxidation Potential
NA = Not Analyzed

Footnotes
(1) Site only sampled during 4th Quarter.
(2) Location only sampled during 2nd Quarter when Site L2 is not sampled.
(3) Parameters not measured. Well was sampled using a bailer due to turbidity.

TABLE 2-2

Monitoring Well Information Table - Manufacturing Area
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Joliet Army Ammunition Plant
Will County, Illinois

Area/Well ID	Site	Northing (Feet)	Easting (Feet)	TOC Elevation (MSL)	Ground Elevation (MSL)	Depth to Top of Screen (BGS)	Depth to Bottom of Screen (BGS)	Total Borehole Depth (BGS)	Depth to Water October 2014 (TOC)	Water Elevation October 2014 (MSL)	Depth to Water November 2014 (TOC)	Water Elevation November 2014 (MSL)	Depth to Water December 2014 (TOC)	Water Elevation December 2014 (MSL)	Depth to Bedrock From Log (BGS)	Bedrock Elevation from Log (MSL)	Year Installed	Formation Designation	Screen Length (Feet)	Casing & Screen Diameter (Inches)
MW104	M1	15019989.4	1318790.5	549.10	546.20	7.0	27.0	30.0	6.55	542.55	**NM**	**NM**	6.15	542.95	27.0	519.2	1981	OVB	20.0	4.0
MW105		15020111.7	1320854.1	555.00	552.50	7.0	27.0	29.9	6.50	548.50	**NM**	**NM**	5.67	549.33	24.0	528.5	1981	COMBO	20.0	4.0
MW106		15020948.8	1318761.3	542.00	539.70	10.0	30.0	32.0	4.39	537.61	**NM**	**NM**	**NM**	**NM**	21.0	518.7	1981	COMBO	20.0	4.0
MW107		15021094.2	1320422.3	552.40	549.10	5.5	25.5	27.4	6.84	545.56	**NM**	**NM**	6.57	545.83	17.0	532.1	1981	COMBO	20.0	4.0
MW201		15020020.6	1318931.6	546.15	544.01	46.5	66.5	70.5	3.42	542.73	**NM**	**NM**	3.18	542.97	24.0	520.0	1988	BRK	20.0	4.0
MW231		15020828.1	1319861.0	550.33	548.47	6.0	16.0	15.7	4.32	546.01	**NM**	**NM**	4.96	545.37	16.0	532.5	1988	OVB	10.0	4.0
MW347		15020481.0	1319595.0	551.73	549.84	14.4	24.4	27.0	4.77	546.96	**NM**	**NM**	**NM**	**NM**	18.5	531.3	1991	COMBO	10.0	4.0
MW351		15021257.8	1319798.9	548.38	545.68	9.5	19.5	22.7	5.00	543.38	**NM**	**NM**	4.69	543.69	22.5	523.2	1991	OVB	10.0	4.0
MW640		15021244.2	1319804.0	548.12	545.40	29.0	39.0	40.0	4.20	543.92	**NM**	**NM**	3.95	544.17	23.0	522.4	1999	BRK	10.0	4.0
MW641		15021873.5	1319350.2	544.50	541.98	7.0	17.0	17.2	2.40	542.10	**NM**	**NM**	2.20	542.30	29.0	516.1	1999	OVB	10.0	4.0
MW642		15021874.4	1319339.9	544.47	541.95	29.0	39.0	40.0	2.95	541.52	**NM**	**NM**	2.69	541.78	29.0	516.1	1999	BRK	10.0	4.0
MW643		15022117.7	1318719.9	540.03	537.55	4.3	7.2	7.8	6.03	534.00	**NM**	**NM**	6.05	533.98	7.3	530.3	2001	OVB	2.9	4.0
MW644		15022128.9	1318718.6	540.23	537.55	10.8	20.4	21.0	6.21	534.02	**NM**	**NM**	5.97	534.26	7.3	530.3	2001	BRK	9.6	4.0
MW645		15022269.1	1318648.7	541.47	538.90	7.5	11.5	12.0	8.62	532.85	**NM**	**NM**	8.51	532.96	10.5	528.4	2001	OVB	4.0	4.0
MW646		15022257.3	1318650.5	541.48	539.09	12.3	21.9	22.5	8.47	533.01	**NM**	**NM**	8.38	533.10	10.5	528.6	2001	BRK	9.6	4.0
MW647		15022572.9	1318013.0	538.40	535.96	7.3	16.9	17.5	5.84	532.56	**NM**	**NM**	5.85	532.55	6.0	530.0	2001	BRK	9.6	4.0
MW648		15022428.3	1319438.1	546.77	544.17	7.3	16.8	17.4	6.04	540.73	**NM**	**NM**	5.88	540.89	13.5	530.7	2001	OVB	9.6	4.0
MW649		15021299.5	1318723.2	543.10	540.49	7.0	16.6	17.2	7.29	535.81	**NM**	**NM**	6.52	536.58	7.5	533.0	2001	COMBO	9.6	4.0
MW111	M3	15028903.0	1318551.6	531.80	529.40	10.5	54.0	54.0	**NM**	**NM**	**NM**	**NM**	7.40	524.40	10.0	519.4	1981	BRK	43.5	4.0
MW112		15030353.7	1318557.9	534.10	531.70	7.2	27.2	29.0	3.72	530.38	**NM**	**NM**	4.18	529.92	8.0	523.7	1981	BRK	20.0	4.0
MW113		15030379.5	1319676.1	536.32	533.70	7.2	27.2	28.0	4.84	531.48	**NM**	**NM**	4.99	531.33	5.0	528.7	1981	BRK	20.0	4.0
MW154		15027749.6	1318572.5	533.06	529.15	5.5	9.1	9.1	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	8.0	521.2	1982	COMBO	3.6	4.0
MW203		15029235.4	1318551.2	534.23	532.02	10.5	25.5	25.5	2.03	532.20	**NM**	**NM**	**NM**	**NM**	5.5	526.5	1988	BRK	15.0	4.0
MW232		15030123.9	1318974.4	535.79	533.38	20.0	35.0	37.0	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	7.0	526.4	1988	BRK	15.0	4.0
MW233		15029737.9	1319024.9	535.58	532.96	10.0	25.0	25.5	**NM**	**NM**	**NM**	**NM**	4.99	530.59	2.5	530.5	1988	BRK	15.0	4.0
MW348		15029911.3	1318978.0	535.71	532.61	16.5	31.5	35.0	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	3.0	529.6	1991	BRK	15.0	4.0
MW352		15029602.8	1318617.3	534.89	532.33	19.0	34.0	34.5	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	6.0	526.3	1991	BRK	15.0	4.0
MW353		15030120.6	1318562.3	534.64	531.86	17.0	32.0	34.0	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	2.0	529.9	1991	BRK	15.0	4.0
MW115	M4	15032589.5	1318485.3	533.40	530.80	7.2	27.2	28.0	6.72	526.68	**NM**	**NM**	6.24	527.16	2.0	528.8	1981	BRK	20.0	4.0
MW157		15032947.3	1319827.0	535.02	531.37	3.7	10.2	10.5	3.34	531.68	**NM**	**NM**	3.18	531.84	6.5	524.9	1982	COMBO	6.5	2.0
MW158		15032970.9	1319820.0	534.40	531.58	9.0	29.5	31.9	3.02	531.38	**NM**	**NM**	3.04	531.36	5.0	526.6	1982	BRK	20.5	3.0
MW114R	M5	15031315.3	1323651.6	556.80	554.9	6.5	21.5	22.0	10.58	546.22	**NM**	**NM**	**NM**	**NM**	15.0	539.9	2001	COMBO	15.0	4.0
MW127R		15032537.2	1326273.8	596.04	592.9	30.0	45.0	46.0	42.17	553.87	**NM**	**NM**	42.51	553.53	40.0	552.9	2001	COMBO	15.0	4.0
MW207R		15032188.9	1323779.7	560.21	557.5	7.0	17.0	18.0	11.71	548.50	**NM**	**NM**	12.14	548.07	15.5[1]	542.0[1]	2001	OVB	10.0	4.0
MW354R		15031780.2	1323424.2	559.61	557.6	7.0	17.0	18.0	14.02	545.59	**NM**	**NM**	**NM**	**NM**	19.0	538.6	2001	OVB	10.0	4.0
MW355R		15030827.1	1323676.8	558.12	555.7	10.0	20.0	22.0	11.88	546.24	**NM**	**NM**	**NM**	**NM**	15.0	540.7	2001	COMBO	10.0	4.0
MW356R		15031372.5	1322054.0	558.08	556.1	24.5	34.5	35.0	17.80	540.28	**NM**	**NM**	18.86	539.22	20.0	536.1	2001	BRK	10.0	4.0
MW117	M6	15036450.2	1318407.7	529.10	526.90	7.7	27.7	27.7	4.10	525.00	**NM**	**NM**	3.43	525.67	12.0	514.9	1981	COMBO	20.0	4.0
MW122		15038443.3	1321305.0	540.10	537.40	7.0	27.0	27.5	4.47	535.63	**NM**	**NM**	**NM**	**NM**	6.5	530.9	1981	BRK	20.0	4.0
MW123R		15035314.9	1320626.1	537.22	534.9	15.0	30.0	32.0	5.16	532.06	**NM**	**NM**	5.20	532.02	10.0	524.9	2001	BRK	15.0	4.0
MW125R		15037201.5	1322981.6	567.69	565.1	12.0	32.0	33.0	13.97	553.72	**NM**	**NM**	14.57	553.12	26.0	539.1	2001	COMBO	20.0	4.0
MW160		15034274.9	1321203.9	542.29	538.20	3.3	6.3	10.4	6.66	535.63	**NM**	**NM**	6.67	535.62	6.0	532.2	1982	OVB	3.0	2.0
MW162R		15035325.7	1320625.8	540.19	537.7	4.5	9.5	10.0	5.28	534.91	**NM**	**NM**	5.04	535.15	3.7[1]	534.0[1]	2001	COMBO	5.0	4.0
MW164		15037035.7	1321868.5	545.21	541.69	3.0	6.0	9.7	6.47	538.74	**NM**	**NM**	**NM**	**NM**	6.0	535.7	1982	OVB	3.0	4.0
MW165		15037644.2	1321700.3	544.01	540.31	2.8	5.3	9.0	5.72	538.29	**NM**	**NM**	5.77	538.24	5.0	535.3	1982	OVB	2.5	4.0
MW166R		15039129.4	1322675.0	558.21	555.6	10.0	20.0	21.0	13.25	544.96	**NM**	**NM**	13.50	544.71	**UNKNOWN**	**UNKNOWN**	2001	OVB	10.0	4.0
MW208		15035028.4	1320126.9	538.38	535.10	12.0	27.0	30.1	4.55	533.83	**NM**	**NM**	**NM**	**NM**	4.0	531.1	1988	BRK	15.0	4.0
MW209		15037473.3	1320271.3	537.75	534.89	19.5	34.5	34.5	3.95	533.80	**NM**	**NM**	**NM**	**NM**	11.1	523.8	1988	BRK	15.0	4.0
MW210R		15035465.0	1322154.0	565.83	564.30	10.7	20.0	20.0	10.78	555.05	**NM**	**NM**	11.44	554.39	**NE**	**NE**	1998	OVB	10.0	4.0
MW212R		15035415.0	1321862.0	567.74	565.30	9.5	19.5	21.0	14.64	553.10	**NM**	**NM**	15.27	552.47	**NE**	**NE**	1998	OVB	10.0	4.0
MW213R		15035462.0	1322159.0	566.49	564.30	38.0	53.0	54.0	19.23	547.26	**NM**	**NM**	19.77	546.72	30.5	533.8	1998	BRK	15.0	4.0

TABLE 2-2

Monitoring Well Information Table - Manufacturing Area
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Will County, Illinois

Area/Well ID	Site	Northing (Feet)	Easting (Feet)	TOC Elevation (MSL)	Ground Elevation (MSL)	Depth to Top of Screen (BGS)	Depth to Bottom of Screen (BGS)	Total Borehole Depth (BGS)	Depth to Water October 2014 (TOC)	Water Elevation October 2014 (MSL)	Depth to Water November 2014 (TOC)	Water Elevation November 2014 (MSL)	Depth to Water December 2014 (TOC)	Water Elevation December 2014 (MSL)	Depth to Bedrock From Log (BGS)	Bedrock Elevation from Log (MSL)	Year Installed	Formation Designation	Screen Length (Feet)	Casing & Screen Diameter (Inches)
MW215R	M6	15035410.0	1321863.0	567.27	565.30	38.5	53.5	54.5	21.00	546.27	**NM**	**NM**	21.50	545.77	30.0	535.3	1998	BRK	15.0	4.0
MW307		15033821.0	1321855.8	563.56	561.45	17.0	27.0	31.7	19.60	543.96	**NM**	**NM**	19.80	543.76	**NE**	**NE**	1991	OVB	10.0	4.0
MW308		15033810.7	1321837.6	563.84	561.38	50.5	65.5	71.8	21.97	541.87	**NM**	**NM**	22.16	541.68	35.0	526.4	1991	BRK	15.0	4.0
MW309		15034826.8	1321825.3	565.59	563.43	12.7	27.7	30.6	11.28	554.31	**NM**	**NM**	11.76	553.83	30.0	533.4	1991	OVB	15.0	4.0
MW310R		15034823.0	1321824.0	565.17	563.00	44.5	59.5	60.0	21.88	543.29	**NM**	**NM**	22.45	542.72	31.0	532.0	1998	BRK	15.0	4.0
MW311		15038100.4	1322342.5	548.85	546.36	14.0	24.0	26.4	0.39	548.46	**NM**	**NM**	1.29	547.56	7.0	539.4	1991	BRK	10.0	4.0
MW312		15038100.6	1322332.5	548.59	545.96	40.0	55.0	58.1	0.16	548.43	**NM**	**NM**	1.02	547.57	7.0	539.0	1991	BRK	15.0	4.0
MW313		15037051.7	1321934.0	551.07	549.20	25.0	40.0	40.9	12.00	539.07	**NM**	**NM**	12.23	538.84	12.0	537.2	1991	BRK	15.0	4.0
MW314		15034383.6	1321451.5	542.32	539.53	9.7	14.7	17.8	6.86	535.46	**NM**	**NM**	6.98	535.34	7.2	532.3	1991	BRK	5.0	4.0
MW315		15034394.6	1321451.7	541.60	538.91	29.7	44.7	47.9	6.10	535.50	**NM**	**NM**	6.22	535.38	6.5	532.4	1991	BRK	15.0	4.0
MW316		15036232.3	1321257.1	542.89	540.49	13.0	18.0	20.9	9.21	533.68	**NM**	**NM**	6.27	536.62	7.5	533.0	1991	BRK	5.0	4.0
MW317		15036222.4	1321257.7	542.96	540.71	34.0	49.0	49.0	6.71	536.25	**NM**	**NM**	6.73	536.23	8.0	532.7	1991	BRK	15.0	4.0
MW318		15037189.7	1321488.6	547.67	545.23	11.8	21.8	24.2	10.08	537.59	**NM**	**NM**	10.26	537.41	11.5	533.7	1991	BRK	10.0	4.0
MW319		15037202.6	1321489.8	548.10	545.49	40.0	55.0	57.0	10.31	537.79	**NM**	**NM**	10.48	537.62	12.0	533.5	1991	BRK	15.0	4.0
MW320R		15039129.7	1322656.0	557.09	554.6	30.5	45.5	46.0	11.92	545.17	**NM**	**NM**	12.23	544.86	8.0[1]	546.6[1]	2001	BRK	15.0	4.0
MW650		15037950.2	1322588.0	566.45	563.83	12.0	22.0	22.5	10.73	555.72	**NM**	**NM**	11.19	555.26	23.0[1]	560.8[1]	1999	OVB	10.0	4.0
MW651		15037939.2	1322583.7	566.88	563.83	36.0	46.0	47.0	17.98	548.90	**NM**	**NM**	18.35	548.53	23.0	560.8	1999	BRK	10.0	4.0
MW652		15037004.9	1322243.1	565.03	561.93	11.0	21.0	22.0	11.41	553.62	**NM**	**NM**	11.91	553.12	25.0[1]	536.9[1]	1999	OVB	10.0	4.0
MW653		15036994.6	1322239.1	564.60	561.93	36.0	46.0	47.0	17.51	547.09	**NM**	**NM**	18.05	546.55	25.0	536.9	1999	BRK	10.0	4.0
MW654		15037070.8	1321976.9	551.15	548.49	13.0	23.0	24.0	12.46	538.69	**NM**	**NM**	12.76	538.39	10.5	539.0	1999	BRK	10.0	4.0
MW655		15034232.3	1320633.2	540.19	537.71	**UNKNOWN**	**UNKNOWN**	**UNKNOWN**	6.54	533.65	**NM**	**NM**	**NM**	**NM**	5.0	532.7	1999	BRK[2]	**UNKNOWN**	4.0
MW662		15039862.6	1321841.5	547.56	**UNKNOWN**	6.0	16.0	18.0	8.08	539.48	**NM**	**NM**	8.10	539.46	20.0	**UNKNOWN**	2001	OVB	10.0	4.0
MW663		15039854.9	1321841.4	547.86	**UNKNOWN**	30.0	40.0	41.0	8.38	539.48	**NM**	**NM**	8.45	539.41	20.0	**UNKNOWN**	2001	BRK	10.0	4.0
MW664		15040136.6	1322326.4	547.43	**UNKNOWN**	5.0	10.0	10.5	7.93	539.50	**NM**	**NM**	8.25	539.18	10.0	**UNKNOWN**	2001	OVB	5.0	4.0
MW665		15040145.7	1322327.5	546.98	**UNKNOWN**	28.0	38.0	40.0	4.22	542.76	**NM**	**NM**	4.43	542.55	10.0	UNKNOWN	2001	BRK	10.0	4.0
MW124R	M7	15033133.0	1320756.0	537.25	534.70	6.0	16.0	16.0	2.30	534.95	**NM**	**NM**	2.71	534.54	5.0	529.7	1998	BRK	10.0	4.0
MW156		15032408.6	1321713.5	541.35	537.45	1.7	5.2	5.4	5.98	535.37	**NM**	**NM**	6.08	535.27	5.3	532.2	1982	OVB	3.5	4.0
MW159		15033457.9	1320537.1	537.80	533.54	4.4	9.4	12.8	5.65	532.15	**NM**	**NM**	**NM**	**NM**	5.7	527.8	1982	COMBO	5.0	4.0
MW216		15033525.6	1320650.6	538.03	536.51	5.0	10.0	36.7	6.27	531.76	**NM**	**NM**	5.92	532.11	11.0	525.5	1988	OVB	5.0	4.0
MW217		15033449.7	1320652.6	538.97	536.90	19.5	34.5	12.0	5.97	533.00	**NM**	**NM**	5.87	533.10	13.4	523.5	1988	BRK	15.0	4.0
MW660		15032597.2	1320677.4	539.73	537.08	7.0	12.0	12.6	5.89	533.84	**NM**	**NM**	5.93	533.80	**UNKNOWN**	**UNKNOWN**	1999	OVB[3]	5.0	4.0
MW661		15032587.2	1320679.2	539.57	537.09	20.0	30.0	30.0	6.92	532.65	**NM**	**NM**	7.00	532.57	**UNKNOWN**	**UNKNOWN**	1999	OVB[3]	10.0	4.0
MW121	M8	15040140.8	1323725.5	575.75	572.50	10.0	30.0	14.2	18.73	557.02	**NM**	**NM**	19.01	556.74	**NE**	**NE**	1981	OVB	20.0	4.0
MW147R		15037926.9	1323318.0	567.82	564.0	6.5	21.5	22.0	10.91	556.91	**NM**	**NM**	12.12	555.70	**NE**	**NE**	2001	OVB	15.0	4.0
MW148RR		15038954.5	1323542.2	561.59	560.7	8.0	23.0	23.5	15.62	545.97	**NM**	**NM**	**NM**	**NM**	18.0	542.7	2001	COMBO	15.0	4.0
MW323R		15036514.7	1323739.7	566.00	563.5	8.0	18.0	18.5	10.59	555.41	**NM**	**NM**	11.65	554.35	**NE**	**NE**	2001	OVB	10.0	4.0
MW324R		15038125.4	1323502.9	566.23	562.7	9.5	19.5	20.0	14.03	552.20	**NM**	**NM**	14.60	551.63	**NE**	**NE**	2001	OVB	10.0	4.0
MW325R		15036105.4	1322633.3	569.62	566.9	7.0	17.0	18.0	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NE**	**NE**	2001	OVB	10.0	4.0
MW327R		15035974.9	1324366.5	565.27	562.57	13.5	18.5	19.0	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	17.0	545.6	2001	COMBO	5.0	4.0
MW328		15040352.8	1323793.0	582.93	580.72	18.0	28.0	19.7	24.52	558.41	**NM**	**NM**	**NM**	**NM**	**NE**	**NE**	1991	OVB	10.0	4.0
MW330		15040218.4	1323970.2	580.33	578.20	15.0	25.0	17.0	22.18	558.15	**NM**	**NM**	22.49	557.84	**NE**	**NE**	1991	OVB	10.0	4.0
MW116	Other Areas	15034538.6	1318460.3	535.20	532.60	7.0	27.0	27.0	3.75	531.45	**NM**	**NM**	4.04	531.16	5.0	527.6	1981	BRK	20.0	4.0
MW118		15039343.5	1318362.2	534.00	531.20	8.0	23.0	23.0	3.36	530.64	**NM**	**NM**	3.30	530.70	2.5	528.7	1981	BRK	15.0	4.0
MW119		15040962.1	1320127.9	538.90	535.50	3.3	23.3	25.5	6.34	532.56	**NM**	**NM**	6.00	532.90	6.0	529.5	1981	COMBO	20.0	4.0

TABLE 2-2

Monitoring Well Information Table - Manufacturing Area
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Area/Well ID	Site	Northing (Feet)	Easting (Feet)	TOC Elevation (MSL)	Ground Elevation (MSL)	Depth to Top of Screen (BGS)	Depth to Bottom of Screen (BGS)	Total Borehole Depth (BGS)	Depth to Water October 2014 (TOC)	Water Elevation October 2014 (MSL)	Depth to Water November 2014 (TOC)	Water Elevation November 2014 (MSL)	Depth to Water December 2014 (TOC)	Water Elevation December 2014 (MSL)	Depth to Bedrock From Log (BGS)	Bedrock Elevation from Log (MSL)	Year Installed	Formation Designation	Screen Length (Feet)	Casing & Screen Diameter (Inches)
AEHA14R	M13	15034927.3	1322519.9	569.73	567.03	16.5	26.5	27.0	16.27	553.46	17.08	552.65	17.15	552.58	UNKNOWN	UNKNOWN	2001	OVB	10.0	4.0
AEHA15		15034695.4	1322493.9	570.38	567.32	UNKNOWN	UNKNOWN	36.5	NM	NM	ABD	ABD	ABD	ABD	UNKNOWN	UNKNOWN	UNKNOWN	OVB[3]	UNKNOWN	2.0
MW126R		15034092.6	1323332.3	562.41	563.00	11.0	21.0	22.0	15.33	547.08	15.38	547.03	15.47	546.94	NE	NE	2004	OVB	10.0	4.0
MW321		15033167.5	1321626.5	545.55	542.93	13.5	23.5	26.6	8.00	537.55	NM	NM	5.87	539.68	9.5	533.4	1991	BRK	10.0	4.0
MW322		15033161.0	1321640.2	544.54	542.26	34.5	49.5	51.5	10.87	533.67	NM	NM	8.26	536.28	9.0	533.3	1991	BRK	15.0	4.0
MW350		15032810.1	1321811.0	554.34	552.34	12.5	22.5	24.8	15.97	538.37	16.38	537.96	10.65	543.69	19.0	533.3	1991	COMBO	10.0	4.0
MW362		15034100.6	1323339.4	562.46	562.78	28.0	33.0	34.0	12.87	549.59	13.32	549.14	13.55	548.91	29.5	533.3	2004	COMBO	5.0	4.0
MW363		15032768.3	1322536.0	570.03	567.66	21.0	31.0	32.0	28.01	542.02	28.36	541.67	28.47	541.56	31.5	536.2	2004	OVB	10.0	4.0
MW364		15032775.4	1322527.2	569.82	567.69	37.0	42.0	42.5	27.89	541.93	28.30	541.52	28.38	541.44	31.5	536.2	2004	BRK	5.0	4.0
MW806		15034807.2	1323337.9	565.53	UNKNOWN	15.0	25.0	25.0	13.24	552.29	13.88	551.65	14.15	551.38	29.0	UNKNOWN	2008	OVB	10.0	4.0
MW807		15034817.4	1323338.1	565.79	UNKNOWN	35.0	45.0	45.0	15.25	550.54	15.62	550.17	15.86	549.93	29.0	UNKNOWN	2008	BRK	10.0	4.0
MW808		15034539.9	1322493.1	569.23	UNKNOWN	15.0	25.0	25.0	16.74	552.49	17.42	551.81	17.56	551.67	30.0	UNKNOWN	2008	OVB	10.0	4.0
MW809		15034530.2	1322492.9	569.18	UNKNOWN	35.0	45.0	45.0	19.34	549.84	19.98	549.20	20.01	549.17	30.0	UNKNOWN	2008	BRK	10.0	4.0
MW811		15034212.0	1323111.7	568.24	565.60	20.0	30.0	30.2	NM	NM	20.83	547.41	20.72	547.52	30.2	535.4	2014	OVB	10.0	2.0
MW108	M11	15025248.1	1320261.2	543.60	540.80	7.0	27.0	27.0	NM	NM	NM	NM	NM	NM	9.0	531.8	1981	COMBO	20.0	4.0
MW333		15026529.4	1319776.9	536.41	533.63	17.9	32.9	34.5	NM	NM	NM	NM	3.02	533.39	5.0	528.6	1991	BRK	15.0	4.0
MW334		15025998.4	1319521.8	536.22	533.40	19.0	34.0	35.0	NM	NM	NM	NM	3.30	532.92	5.0	528.4	1991	BRK	15.0	4.0
MW335		15025671.9	1319364.8	538.36	535.66	9.4	19.4	19.5	NM	NM	NM	NM	6.02	532.34	6.0	529.7	1991	BRK	10.0	4.0
MW336		15025322.1	1319223.4	537.28	534.79	12.0	22.0	23.5	NM	NM	NM	NM	5.20	532.08	7.5	527.3	1991	BRK	10.0	4.0
MW337		15024992.0	1319103.4	536.96	534.32	21.1	36.1	35.0	NM	NM	NM	NM	5.29	531.67	6.5	527.8	1991	BRK	15.0	4.0
MW338		15024414.1	1318777.5	537.73	534.70	13.5	28.5	30.5	NM	NM	NM	NM	NM	NM	3.0	531.7	1991	BRK	15.0	4.0
MW339		15023897.9	1318660.6	541.27	538.41	9.7	19.7	20.0	NM	NM	NM	NM	NM	NM	9.0	529.4	1991	BRK	10.0	4.0
MW340		15023157.7	1318683.2	542.47	539.83	7.0	17.0	22.0	NM	NM	NM	NM	NM	NM	10.0	529.8	1991	COMBO	10.0	4.0
MW802		15025690.0	1320235.7	543.42	541.62	5.0	15.0	15.0	NM	NM	NM	NM	6.72	536.70	9.5	532.1	2008	COMBO	10.0	4.0
MW803		15025697.7	1320237.5	543.66	541.56	26.5	36.5	36.5	NM	NM	NM	NM	2.57	541.09	9.5	532.1	2008	BRK	10.0	4.0
MW804		15025916.1	1319219.3	536.48	533.78	5.0	15.0	15.0	NM	NM	NM	NM	4.69	531.79	3.5	530.3	2008	BRK	10.0	4.0
MW805		15025913.6	1319229.6	536.27	533.62	25.0	35.0	35.0	NM	NM	NM	NM	11.08	525.19	3.5	530.1	2008	BRK	10.0	4.0

Notes:

Coordinates are Universal Transverse Mercator (UTM), Zone 16 East, North American Datum 1983 (NAD83)

UNKOWN = indicate data not presented on borelogs or provided in RI/FS documentation.

NM = Water level not measured.

NE = not encountered

BRK = Bedrock

OVB = Overburden

COMBO = Combination Overburden and Bedrock Well

MSL = Feet relative to mean seal level

BGS = Feet below ground surface

ID = identification

TOC = Top of Casing

ABD = Well abandoned October 2014.

Footnotes:

(1) Bedrock elevation from depth to bedrock from boring log for original monitoring well or the depth to bedrock from nested monitoring well.
(2) Designation assumed based on shallow depth to bedrock, screen length unknown.
(3) Designation assumed, depth to bedrock unknown.

TABLE 2-3

Monitoring Well Information Table - LAP Area
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Area/Well ID	Site	Northing (Feet)	Easting (Feet)	TOC Elevation (MSL)	Ground Elevation (MSL)	Depth to Top of Screen (BGS)	Depth to Bottom of Screen (BGS)	Total Borehole Depth (BGS)	Depth to Water October 2014 (TOC)	Water Elevation October 2014 (MSL)	Depth to Water December 2014 (TOC)	Water Elevation December 2014 (MSL)	Depth to Bedrock From Log (BGS)	Bedrock Elevation from Log (MSL)	Year Installed	Well Designation	Screen Length (Feet)	Casing & Screen Diameter (Inches)
MW131	L1	15029483.20	1344039.100	625.01	622.29	2.5	22.5	24.0	14.71	610.30	16.22	608.79	**NE**	**NE**	1981	OVB	20.0	4.0
MW171		15028774.67	1343406.032	618.24	615.03	2.9	7.9	11.1	10.72	607.52	**DRY**	**DRY**	8.0	607.0	1982	OVB	5.0	4.0
MW172		15028836.84	1344094.147	615.87	613.19	14.5	34.5	37.5	**NM**	**NM**	9.15	606.72	11.0	602.2	1982	BRK	20.0	4.0
MW173		15028827.26	1344123.204	615.56	612.56	2.8	11.8	15.2	8.55	607.01	8.93	606.63	12.0	600.6	1982	OVB	9.0	3.6
MW174		15028974.94	1344649.467	615.32	612.40	3.5	14.5	18.1	8.38	606.94	8.70	606.62	15.0	597.4	1982	OVB	11.0	3.6
MW175		15029420.69	1343046.596	634.45	630.96	3.7	19.7	23.2	17.24	617.21	16.84	617.61	20.0	611.0	1982	OVB	16.0	3.6
MW176		15030320.57	1343491.565	646.77	643.49	4.8	20.8	23.6	21.73	625.04	22.11	624.66	20.8	622.7	1982	OVB	16.0	3.6
MW177		15028773.31	1343380.183	616.29	613.84	11.8	31.0	33.4	8.07	608.22	8.23	608.06	6.5	607.3	1983	BRK	19.2	3.0
MW178		15030330.01	1343512.024	643.83	640.39	27.3	46.5	50.1	24.84	618.99	25.61	618.22	20.0	620.4	1983	BRK	19.2	3.0
MW400		15030872.22	1344840.211	655.17	652.56	16.2	26.2	28.6	**NM**	**NM**	**NM**	**NM**	21.0	631.6	1991	COMBO	10.0	4.0
MW401		15028228.22	1344007.476	611.96	610.20	28.5	43.5	46.1	6.48	605.48	6.02	605.94	16.0	594.2	1991	BRK	15.0	4.0
WES1		15029404.21	1343978.508	623.13	621.43	20.0	40.0	40.0	13.43	609.70	14.22	608.91	20.0	601.4	1997	BRK	20.0	4.0
WES2		15029874.92	1343699.213	637.69	635.98	22.0	42.0	42.0	23.31	614.38	24.32	613.37	22.0	614.0	1997	BRK	20.0	4.0
WES3		15028686.71	1344093.581	611.69	610.33	20.0	40.0	40.0	4.92	606.77	5.22	606.47	20.0	590.3	1997	BRK	20.0	4.0
MW610		15028213.06	1344005.102	612.63	609.62	4.0	14.0	14.0	7.10	605.53	7.07	605.56	16.0(1)	594.2(1)	1999	OVB	10.0	4.0
MW611		15027976.15	1344327.569	620.45	617.83	10.0	20.0	21.0	8.96	611.49	8.43	612.02	**NE**	**NE**	1999	OVB	10.0	4.0
MW132	L2	15026868.16	1339653.570	612.30	609.84	7.5	27.5	29.4	**NM**	**NM**	5.65	606.65	18.0	591.8	1981	COMBO	20.0	4.0
MW133		15026726.48	1338362.506	605.88	603.51	7.2	27.2	28.7	**NM**	**NM**	4.29	601.59	19.5	584.0	1981	COMBO	20.0	4.0
MW134		15025646.63	1338233.841	613.30	609.70	6.7	26.7	27.1	**NM**	**NM**	6.95	606.35	**NE**	**NE**	1981	OVB	20.0	4.0
MW135		15025761.10	1339631.781	637.35	634.18	6.0	26.0	27.0	**NM**	**NM**	5.93	631.42	**NE**	**NE**	1981	OVB	20.0	4.0
MW404		15026798.76	1338548.502	605.88	604.09	7.7	17.7	20.5	**NM**	**NM**	3.5	602.38	12.0	592.1	1991	COMBO	10.0	4.0
MW405		15027072.91	1338771.791	607.21	605.16	10.8	20.8	23.5	**NM**	**NM**	4.08	603.13	16.0	589.2	1991	COMBO	10.0	4.0
MW406		15026560.78	1339282.341	623.13	620.72	23.8	33.8	35.7	**NM**	**NM**	16.57	606.56	29.0	591.7	1991	COMBO	10.0	4.0
MW407		15026676.15	1339269.053	620.05	618.30	20.5	30.5	33.9	**NM**	**NM**	14.19	605.86	25.5	592.8	1991	COMBO	10.0	4.0
MW501		15025985.85	1338411.03	617.05	614.72	12.7	22.7	**NA**	**NM**	**NM**	8.94	608.11	25.0	589.7	1991	OVB	10.0	4.0
MW620		15027048.61	1338602.438	605.07	602.41	7.0	17.0	18.0	**NM**	**NM**	2.46	602.61	**UNKNOWN**	**UNKNOWN**	1999	OVB	10.0	4.0
MW621		15027058.70	1338599.038	604.96	602.41	22.0	32.0	32.8	**NM**	**NM**	3.51	601.45	20.0	582.4	1999	BRK	10.0	4.0
MW810		15027142.71	1338476.770	604.58	601.91	7.0	17.3	18.0	**NM**	**NM**	3.51	601.07	**NE**	**NE**	2009	OVB	10.0	4.0
MW1	L3	15025237.01	1338193.456	630.63	628.68	16.5	26.5	27.8	16.89	613.74	16.99	613.64	**NE**	**NE**	1986	OVB	10.0	2.0
MW136		15024523.06	1337305.702	602.70	600.8	7.2	27.2	**NA**	7.69	595.01	6.61	596.09	11.0	589.8	1981	COMBO	20.0	4.0
MW137		15024661.00	1338608.636	632.90	631.40	7.0	27.0	28.7	19.26	613.64	14.90	618.00	**NE**	**NE**	1981	OVB	20.0	4.0
MW3		15025504.29	1337801.715	610.34	608.50	9.0	19.0	20.9	4.33	606.01	4.18	606.16	19.0	589.5	1986	OVB	10.0	2.0
MW410		15025282.41	1337409.613	604.38	**NA**	8.0	18.0	20.3	14.40	589.98	12.20	592.18	**NE**	**NE**	1993	OVB	10.0	4.0
MW411		15024977.88	1337383.946	616.71	**NA**	13.0	23.0	25.1	19.57	597.14	18.23	598.48	18.0	594.5	1991	COMBO	10.0	4.0
MW412		15024596.02	1337101.399	599.14	597.41	7.4	17.4	19.2	6.45	592.69	5.13	594.01	3.0	594.4	1991	BRK	10.0	4.0

TABLE 2-3

Monitoring Well Information Table - LAP Area
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Area/Well ID	Site	Northing (Feet)	Easting (Feet)	TOC Elevation (MSL)	Ground Elevation (MSL)	Depth to Top of Screen (BGS)	Depth to Bottom of Screen (BGS)	Total Borehole Depth (BGS)	Depth to Water October 2014 (TOC)	Water Elevation October 2014 (MSL)	Depth to Water December 2014 (TOC)	Water Elevation December 2014 (MSL)	Depth to Bedrock From Log (BGS)	Bedrock Elevation from Log (MSL)	Year Installed	Well Designation	Screen Length (Feet)	Casing & Screen Diameter (Inches)
MW630	L3	15024770.15	1337013.674	595.06	592.23	7.0	12.0	12.7	6.68	588.38	6.70	588.36	4.0	588.2	1999	BRK	5.0	4.0
MW631		15024764.63	1337010.736	595.09	592.23	16.0	26.0	27.0	4.64	590.45	4.47	590.62	4.0	588.2	1999	BRK	10.0	4.0
MW632		15024828.58	1336912.350	606.25	603.75	12.0	27.2	27.5	16.06	590.19	16.27	589.98	9.5	594.3	2009	BRK	15.0	4.0
MW633		15024474.50	1336978.448	600.37	597.90	7.0	17.0	18.0	8.60	591.77	7.54	592.83	5.0	592.9	1999	BRK	10.0	4.0
H-7	L14	15019448.58	1332662.795	584.62	581.45	4.0	14.0	15.5	**NM**	**NM**	9.00	575.62	12.0	569.5	1982	OVB	10.0	2.0
H-8		15019409.64	1333457.292	591.40	588.14	7.0	22.0	22.9	**NM**	**NM**	7.21	584.19	20.0	568.1	1982	OVB	15.0	2.0
MW140		15018819.68	1332901.750	584.59	581.68	7.0	27.0	30.3	**NM**	**NM**	9.77	574.82	22.0	559.7	1981	COMBO	20.0	4.0
MW508		15019632.37	1333106.169	587.44	585.34	10.0	20.0	22.9	**NM**	**NM**	9.01	578.43	**NE**	**NE**	1993	OVB	10.0	4.0
MW511		15019645.92	1333029.631	587.45	584.98	4.0	14.0	17.0	**NM**	**NM**	9.39	578.06	16.0	569.0	1997	OVB	10.0	4.0
MW512		15019541.13	1333111.131	588.04	585.98	5.0	15.0	18.2	**NM**	**NM**	9.57	578.47	16.0	570.0	1997	OVB	10.0	4.0
MW600		15019920.13	1332928.643	587.22	584.75	6.0	11.0	11.0	**NM**	**NM**	8.91	578.31	11.0	573.8	1998	OVB	5.0	2.0
MW601		15019196.31	1333121.302	586.72	584.29	9.0	19.0	20.0	**NM**	**NM**	8.32	578.40	19.6	564.7	1998	OVB	10.0	2.0
MW602		15019432.73	1332663.469	583.83	581.22	21.0	31.0	31.0	**NM**	**NM**	9.95	573.88	12.0	569.2	1999	BRK	10.0	4.0
MW603		15019323.75	1332379.579	580.77	578.27	6.0	16.0	16.0	**NM**	**NM**	8.57	572.20	13.0	565.3	1999	COMBO	10.0	4.0
MW604		15019335.87	1332379.437	581.12	578.27	20.0	30.0	31.0	**NM**	**NM**	8.65	572.47	13.0	565.3	1999	BRK	10.0	4.0

General Notes

Coordinates are Universal Transverse Mercator (UTM), Zone 16 East, North American Datum 1983 (NAD83)

NE = Not Encountered.

UNKOWN = indicate data not presented on borelogs or provided in RI/FS documentation.

NM = Water level not measured.

BRK = Bedrock

OVB = Overburden

COMBO = Combination Overburden/Bedrock Well

MSL = Feet Relative to Mean Seal Level

BGS = Feet Below Ground Surface

ID = Identification

TOC = Top of Casing

Footnotes:

(1) Based on the depth to bedrock from nested monitoring well.

TABLE 2-4

Surface Water Elevations
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Surface Water Location	Surface Water Elevation			
		Date	**ft (MSL)**	**Date**	**ft (MSL)**
L1	SW550	10/28/2014	603.88	12/9/2014	603.94
L2	SW555	**NM**	**NM**	12/10/2014	600.45
L3	SW557	**NM**	**NM**	**NM**	**NM**
	SW558	**NM**	**NM**	**NM**	**NM**
	SW777	10/23/2014	588.31	12/10/2014	588.33
	SW004	10/23/2014	590.27	12/10/2014	590.40
M1	SW709	10/28/2014	532.88	12/8/2014	533.01

Notes:
ft = feet
MSL = Mean Sea Level
NM = Not Measured

Table 3-1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**1,3-DNB**		**2,4-DNT**		**2,6-DNT**		**2-A-4,6-DNT**		**4-A-2,6-DNT**		**HMX**		**NB**		**2-NT**		**3-NT**		**4-NT**		**RDX**		**Tetryl**		**1,3,5-TNB**		**2,4,6-TNT**	
		Units	μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L	
		Project Action Limit[(1)]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
L1	***In-Plume***																													
	MW131	10/28/2014	<0.38		<0.38		<0.19		58	/ J	<0.19		<0.38		<0.38		160	/ J	<0.38		<0.95		<0.19		2.2	/ J	**910**	/ J	**1100**	/ J
		12/9/2014	<83		<0.42	U / UJ	<42		11	/ J	<0.21	U / UJ	<83		<83		<83		<83		<210		<42		<50		**2000**		**1500**	
	MW173	10/27/2014	<0.39		<0.39		<0.19		4.3		5.9		1.5	/ J	<0.39		<0.39		<0.39		<0.96		**9**		<0.23	U / UJ	<0.96		6.2	
		12/9/2014	<0.41		<0.41		<0.2		2.2	/ J	2.7		0.67		<0.41		<0.41		<0.41		<1		**4.4**		<0.25		<1		4.3	
	WES1	10/28/2014	<0.37		<0.37		<0.19		5.9	/ J	6.9	/ J	<0.37		<0.37		0.23	F / J	<0.37		<0.93		<0.19		<0.22	U / UJ	**16**	/ J	**14**	/ J
		12/9/2014	<0.39		<0.39		<0.2		2.3	/ J	2.7		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24		0.27	F / J	1.1	
	Early Warning																													
	MW174	10/28/2014	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	
		12/9/2014	<0.37		<0.37		<0.19		<0.19	U / UJ	<0.19		<0.37		<0.37		<0.37		<0.37		<0.94		<0.19		<0.22		<0.94		<0.37	
	WES3	10/27/2014	<0.37		<0.37		<0.18		0.77		1		<0.37		<0.37		<0.37		<0.37		<0.92		<0.18		<0.22	U / UJ	<0.92		0.95	
		12/9/2014	<0.38		<0.38		<0.19		0.71	/ J	0.89		<0.38		<0.38		<0.38		<0.38		<0.96		0.5		<0.23		<0.96		0.85	
	Compliance																													
	SW550	10/28/2014	<0.37		<0.37		<0.19		<0.19		<0.19		<0.37		<0.37		<0.37		<0.37		<0.94		<0.19		<0.22	U / UJ	<0.94		<0.37	
		12/9/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23		<0.94		<0.38	
L2	***In-Plume***																													
	MW404	12/10/2014	<4.1		<4.1		<2.1		<2.1		<2.1		27		<4.1		<4.1		<4.1		<10		**93**		<2.5		<10		<0.41	
	Early Warning																													
	MW620	12/10/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
	Compliance																													
	MW621	12/10/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
	SW555	12/10/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
L3	***Upgradient***																													
	SW004	10/23/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
	In-Plume																													
	MW410	10/23/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
		12/10/2014	<0.39		<0.39		<0.2		<0.2	U / UJ	<0.2		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24		<0.98		<0.39	
	In-Plume/Downgradient																													
	MW412	10/23/2014	<0.4		<0.4		<0.2		0.91		1.4		29		<0.4		<0.4		<0.4		<0.99		**85**		<0.24	U / UJ	<0.99		<0.4	
		12/10/2014	<3.9		<0.39		<0.19		0.72	/ J	<1.9		24	/ J	<0.39		<0.39		<0.39		<0.97		**85**	/ J	<0.23		<0.97		<0.39	
	Early Warning/Downgradient																													
	MW630	10/23/2014	<0.38		<0.38		<0.19		<0.19		<0.19		2.4		<0.38		<0.38	U / UJ	<0.38		<0.95		**3.5**		<0.23	U / UJ	<0.95		<0.38	
		10/23/2014 (DUP)	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		2.2		<0.4		<0.4		<0.4		<1		**3.4**		<0.24	U / UJ	<1		<0.4	
		12/10/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		2.8		<0.4		<0.4		<0.4		<0.99		**5**		<0.24		<0.99		<0.4	
		12/10/2014 (DUP)	<0.39		<0.39		<0.2		<0.2	U / UJ	<0.2		3		<0.39		<0.39		<0.39		<0.99		**5.4**		<0.24		<0.99		<0.39	

Table 3-1

Summary of Analytical Results - Explosives
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		Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
L3	***Early Warning/Downgradient***																													
	MW631	10/23/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
	MW631	10/23/2014 (DUP)	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
	MW631	12/10/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.96		<0.19		<0.23		<0.96		<0.38	
	MW631	12/10/2014 (DUP)	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23		<0.95		<0.38	
	MW633	10/23/2014	<0.37		<0.37		<0.18		<0.18		<0.18		1.3		<0.37		<0.37		<0.37		<0.92		**3.8**		<0.22	U / UJ	<0.92		<0.37	
	MW633	12/10/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		0.97		<0.38		<0.38		<0.38		<0.96		**2.9**		<0.23		<0.96		<0.38	
	Compliance/Downgradient																													
	SW777	10/23/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
	SW777	12/10/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.96		<0.19		<0.23		<0.96		<0.38	
	Downgradient																													
	SW557	10/23/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
	SW557	12/10/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23		<0.94		<0.38	
	SW558	10/23/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	
	SW558	12/10/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24		<0.99		<0.4	
L14	***In-Plume***																													
	MW511	12/9/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		24		<0.38		<0.38		<0.38		<0.96		**160**		<0.23		<0.96		<0.38	
	MW512	12/9/2014	<0.38		<0.38		<0.19		0.75	/ J	1.1		36		<0.38		<0.38		<0.38		<0.95		**86**		<0.23		<0.95		<0.38	
	Early Warning																													
	H7	12/9/2014	<0.39		<0.39		<0.2		<0.2	U / UJ	<0.2		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24		<0.98		<0.39	
MFG	***In-Plume***																													
	MW212R	10/22/2014	1.5	/ J	**620**	/ J	**300**	/ J	37	/ J	24	/ J	<0.39		1.6	/ J	1800	/ J	490	/ J	1700	/ J	<0.2		<0.24	U / UJ	<0.98		**60**	/ J
	MW212R	10/22/2014 (DUP)	1.7	/ J	**590**	/ J	**300**	/ J	24	/ J	19	/ J	<0.4		3.3	/ J	1700	/ J	390	/ J	1600	/ J	<0.2		<0.24	U / UJ	<1		**85**	/ J
	MW212R	12/18/2014	<810		**5800**		**1500**		<410		<410		<810		<810		**22000**		1900		12000		<410		<2.4		**8.4**	F /	**940**	
	MW212R	12/18/2014 (DUP)	<800		**3800**		**930**		<400		<400		<800		<800		**14000**		1400		8600		<400		<480		3.2	F /	**460**	
	MW652	10/22/2014	**14**	/ J	**5100**	/ J	**3000**	/ J	150	/ J	170	/ J	<4		27	/ J	**17000**	/ J	2700	/ J	16000	/ J	<2		<2.4	U / UJ	<10		**1200**	/ J
	MW652	12/18/2014	7.8		**4700**		**1800**		97		130		<810		17		**19000**		2100		15000		<2		<2.4		<10		**610**	
	Early Warning																													
	MW123R	10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
	MW123R	12/17/2014	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
	MW162R	10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
	MW162R	12/17/2014	<0.41		<0.39		<0.2		<0.21		<0.2		<0.39		<0.39		<0.39		<0.41		<0.98		<0.2		<0.25		<1		<0.41	
	MW313	10/22/2014	<0.39		<0.39		<0.2		<0.2		<0.2		<0.39		<0.39		0.88		<0.39		0.53	F /	<0.2		<0.24	U / UJ	<0.98		<0.39	
	MW313	12/18/2014	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		0.44		<0.4		0.2	F /	<0.2		<0.24		<0.97		<0.39	
	MW318	10/21/2014	1.8	/ J	<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		0.64	/ J	<0.24	U / UJ	<1		<0.4	
	MW318	12/17/2014	1.6		0.2	F /	<0.2		1.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
	MW319	10/21/2014	<0.4	U / UJ	<0.4		<0.2		0.74	/ J	<0.2		<0.4		0.64	/ J	<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1	U / UJ	<0.4	
	MW319	12/17/2014	<0.39		<0.39		<0.2		<0.21		<0.21		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24		<0.98		<0.39	
	MW654	10/22/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
	MW654	12/18/2014	<0.4		<0.4		<0.2		0.08	F / J	<0.2		<0.4		<0.41		0.22	F /	<0.41		<1		<0.2		<0.24		<1		<0.4	
	MW124R	10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	
	MW124R	12/17/2014	<0.41		<0.41		<0.2		<0.2		<0.2		<0.41		<0.39		0.19	F /	<0.41		<0.98		<0.2		<0.24		<0.98		<0.39	

Table 3-1

Summary of Analytical Results - Explosives
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		Compound	**1,3-DNB**		**2,4-DNT**		**2,6-DNT**		**2-A-4,6-DNT**		**4-A-2,6-DNT**		**HMX**		**NB**		**2-NT**		**3-NT**		**4-NT**		**RDX**		**Tetryl**		**1,3,5-TNB**		**2,4,6-TNT**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit(1)	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
MFG	***Compliance***																													
	MW117	10/27/2014	<0.39		<0.39		<0.2		<0.2		<0.2		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24	U / UJ	<0.98		<0.39	
		12/15/2014	<0.39		<0.39		<0.2		<0.2		<0.2		<0.39		<0.39		<0.39		<0.39		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.39	
	MW118	10/27/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
		12/15/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
	MW119	10/27/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.96		<0.19		<0.23	U / UJ	<0.96		<0.39	
		12/17/2014	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	
M13	***Upgradient***																													
	MW806	10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		11/19/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.96		<0.19		<0.23		<0.96		<0.38	
		12/16/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
	MW807	10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		11/19/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24		<0.99		<0.4	
		12/16/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.96		<0.19		<0.23	U / UJ	<0.96		<0.38	
	Downgradient																													
	MW126R	10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	
		11/19/2014	<0.39		<0.39		<0.19		<0.19	U / UJ	<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23		<0.97		<0.39	
		12/16/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
	MW362	10/21/2014	<0.39		**5.7**	/ J	0.42	/ J	1.1	/ J	0.93	/ J	<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24	U / UJ	<0.98		<0.39	
		10/21/2014 (DUP)	<0.4		**5.6**	/ J	**0.43**	/ J	1.1	/ J	0.83	/ J	<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		11/19/2014	<0.38		**7**	/ J	**0.52**	/ J	1.3	/ J	0.9	/ J	<0.38		<0.38		0.084	F / J	<0.38		<0.95		<0.19		<0.23		<0.95		<0.38	
		11/19/2014 (DUP)	<0.4		**7.3**	/ J	**0.56**	/ J	1.4	/ J	1	/ J	<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24		<0.99		<0.4	
		12/16/2014	<0.39		**7.4**	/ J	**0.6**	/ J	1.4	/ J	1.2	/ J	<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
		12/16/2014 (DUP)	<0.4		**7.1**	/ J	**0.54**	/ J	1.3	/ J	1	/ J	<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	

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		Compound	**1,3-DNB**		**2,4-DNT**		**2,6-DNT**		**2-A-4,6-DNT**		**4-A-2,6-DNT**		**HMX**		**NB**		**2-NT**		**3-NT**		**4-NT**		**RDX**		**Tetryl**		**1,3,5-TNB**		**2,4,6-TNT**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit(1)	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13	*Downgradient*																													
	MW808	10/20/2014	<0.41		<0.41		<0.2		<0.2	U / UJ	<0.2		<0.41		<0.41		<0.41		<0.41		<1		<0.2		<0.24	U / UJ	<1		<0.41	
		11/18/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23		<0.94		<0.38	
		12/15/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
	MW809	10/20/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		11/18/2014	<0.37		<0.37		<0.19		<0.19	U / UJ	<0.19		<0.37		<0.37		<0.37		<0.37		<0.93		<0.19		<0.22	U / UJ	<0.93		<0.37	
		12/15/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
	MW811	10/29/2014	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		11/19/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.96		<0.19		<0.23		<0.96		<0.38	
		12/16/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
M11	*Upgradient*																													
	MW802	12/11/2014	<0.37		<0.37		<0.19		<0.19		<0.19		<0.37		<0.37		<0.37		<0.37		<0.93		<0.19		<0.22	U / UJ	<0.93		<0.37	
	MW803	12/15/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
	Downgradient																													
	MW333	12/15/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
	MW334	12/15/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
	MW335	12/11/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
		12/11/2014 (DUP)	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
	MW336	12/11/2014	<0.42		<0.42		<0.21		<0.21		<0.21		<0.42		<0.42		<0.42		<0.42		<1.1		<0.21		<0.25	U / UJ	<1.1		<0.42	
	MW804	12/11/2014	<0.4		<0.4		<0.2		0.066	F / J	0.16	F / J	<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
	MW805	12/11/2014	<0.37		<0.37		<0.19		<0.19		<0.19		<0.37		<0.37		<0.37		<0.37		<0.93		<0.19		<0.22	U / UJ	<0.93		<0.37	

Footnotes:

(1) Project Action Limits (Remedial Goal{RG}) obtained from Worksheet #15 of Appendix B (QAPP) of the *Long Term Monitoring Plan* (Toltest, 2010). IEPA Class II groundwater standards for industrial uses are presented where Class I and Class II standards (potable and industrial uses, respectively) were both available.

General Notes:

Sites L2, L14, and M11 are not sampled during Second Quarter.
µg/L = microgram per liter
Bolded result indicates Project Action Limit (RG) exceedance
NS = No standard
< = Result shows laboratory Method Reporting Limit for non-detected results
LF/VF = Lab Flag/Validation Flag
J = Estimated concentration
U = Not detected
UJ = Not detected, estimated detection limit
F = Concentration below the reported detection limit
DUP = Duplicate

1,3-DNB = 1,3-Dinitrobenzene
2,4-DNT = 2,4-Dinitrotoluene
2,6-DNT = 2,6-Dinitrotoluene
2-A-4,6-DNT = 2-amino-4,6-Dinitrotoluene
4-A-2,6-DNT = 4-amino-2,6-Dinitrotoluene
HMX = High melting explosive
NB = Nitrobenzene
2-NT = 2-Nitrotoluene
3-NT = 3 Nitrotoluene
4-NT = 4-Nitrotoluene
RDX = Research Department Explosive
1,3,5-TNB = 1,3,5-Trinitrobenzene
2,4,6-TNT = 2,4,6-Trinitrotoluene

Table 3-2

Summary of Analytical Results - Target Analyte List Metals
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		Analyte	Aluminum		Antimony		Arsenic		Barium		Cadmium		Calcium		Chromium		Cobalt		Copper		Iron	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit[1]	100		0.024		0.2		NS		0.05		NS		1.0		NS		NS		5.0	
		Surface Water RG	NS		0.61		0.16		5		0.0023		NS		0.44		NS		0.026		1.0	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
L3	***Upgradient***																					
	SW004	10/23/2014	<0.3		<0.02		<0.025		0.044		0.00058	F /	90		<0.015		<0.015		<0.015		0.036	F /
	In-Plume/Downgradient																					
	MW412	10/23/2014	<0.3		<0.02		<0.025		0.046		0.00062	F /	89		<0.015		<0.015		<0.015		<0.1	
		12/10/2014	<0.3		<0.02		<0.025		0.044		<0.005		93		<0.015		<0.015		<0.015		<0.1	
	Early Warning/Downgradient																					
	MW630	10/23/2014	<0.3		<0.02		<0.025		0.013		0.00047	F /	78		<0.015		<0.015		<0.015		0.17	/ J
		10/23/2014 (DUP)	<0.3		<0.02		<0.025		0.013		<0.005		77		<0.015		<0.015		<0.015		0.15	
		12/10/2014	<0.3		<0.02		<0.025		0.013		<0.005		84		<0.015		<0.015		<0.015		<0.1	
		12/10/2014 (DUP)	<0.3		<0.02		<0.025		0.013		<0.005		85		<0.015		<0.015		<0.015		<0.1	
	MW631	10/23/2014	<0.3		<0.02		0.0045	F /	0.018		<0.005		63		<0.015		<0.015		<0.015		0.13	
		12/10/2014	<0.3		<0.02		<0.025		0.015		<0.005		69		<0.015		<0.015		<0.015		<0.1	
		12/10/2014 (DUP)	<0.3		<0.02		<0.025		0.015		<0.005		70		<0.015		<0.015		<0.015		0.022	F /
	MW633	10/23/2014	<0.3		<0.02		<0.025		0.051		<0.005		85		<0.015		<0.015		<0.015		<0.1	
		12/10/2014	0.066	F /	<0.02		<0.025		0.051		<0.005		89		0.0007	F /	<0.015		<0.015		0.23	
	Compliance/Downgradient																					
	SW777	10/23/2014	<0.3		<0.02		0.0062	F /	0.043		0.00048	F /	87		<0.015		<0.015		<0.015		<0.1	
		12/10/2014	<0.3		<0.02		<0.025		0.042		<0.005		94		<0.015		<0.015		<0.015		0.029	F /
	Downgradient																					
	SW557	10/23/2014	<0.3		<0.02		<0.025		0.044		0.00057	F /	89		<0.015		<0.015		<0.015		<0.1	
		12/10/2014	<0.3		<0.02		<0.025		0.042		<0.005		95		<0.015		<0.015		<0.015		<0.1	
	SW558	10/23/2014	<0.3		<0.02		<0.025		0.045		<0.005		89		<0.015		<0.015		<0.015		0.035	F /
		12/10/2014	<0.3		<0.02		<0.025		0.045		<0.005		93		<0.015		<0.015		<0.015		<0.1	

		Analyte	Lead		Magnesium		Manganese		Mercury		Nickel		Potassium		Silver		Sodium		Vanadium		Zinc	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit[1]	0.1		NS		10		NS		NS		NS		0.511		NS		NS		10	
		Surface Water RG	0.064		NS		1.0		0.103		1.0		NS		0.005		NS		NS		1.0	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
L3	***Upgradient***																					
	SW004	10/23/2014	<0.015		39		0.035		<0.0002		<0.04		1.5	F /	<0.015		16		<0.015		<0.15	
	In-Plume/Downgradient																					
	MW412	10/23/2014	<0.015		46		<0.01		<0.0002		<0.04		1.2	F /	<0.015		6.7		<0.015		<0.15	
		12/10/2014	<0.015		50		<0.01		<0.0002		<0.04		1.3	F /	0.0011	F / B	6.7		<0.015		<0.15	
	Early Warning/Downgradient																					
	MW630	10/23/2014	<0.015	U / UJ	40		0.067		<0.0002		<0.04		5.1	/ J	<0.015	U / UJ	25	/ J	<0.015		<0.15	
		10/23/2014 (DUP)	<0.015		39		0.066		<0.0002		<0.04		5		<0.015		24		<0.015		<0.15	
		12/10/2014	<0.015		44		0.011		<0.0002		<0.04		4.8		<0.015		24		0.0013	F /	<0.15	
		12/10/2014 (DUP)	<0.015		45		0.01		<0.0002		<0.04		4.9		0.0014	F / B	23		0.0012	F /	<0.15	
	MW631	10/23/2014	<0.015		33		0.032		<0.0002		<0.04		5.3		<0.015		28		<0.015		<0.15	
		12/10/2014	<0.015		37		0.0068	F /	<0.0002		<0.04		5.5		0.0013	F / B	29		<0.015		<0.15	
		12/10/2014 (DUP)	<0.015		38		0.0073	F /	<0.0002		<0.04		5.5		0.0011	F / B	29		0.0016	F /	0.0075	F /
	MW633	10/23/2014	<0.015		36		<0.01		<0.0002		<0.04		1.3	F /	<0.015		4.7	F /	<0.015		0.0089	F /
		12/10/2014	<0.015		40		0.0036	F /	<0.0002		<0.04		1.1	F /	0.0015	F / B	4.3	F /	<0.015		<0.15	
	Compliance/Downgradient																					
	SW777	10/23/2014	<0.015		38		0.026		<0.0002		<0.04		1.5	F /	<0.015[2]		15		<0.015		<0.15	
		12/10/2014	<0.015		41		0.041		<0.0002		<0.04		1.3	F /	0.00096	F / B	15		0.0016	F /	<0.15	
	Downgradient																					
	SW557	10/23/2014	<0.015		39		0.027		<0.0002		<0.04		1.5	F /	<0.015[2]		15		<0.015		<0.15	
		12/10/2014	<0.015		42		0.045		<0.0002		<0.04		1.3	F /	0.00096	F / B	16		0.0013	F /	<0.15	
	SW558	10/23/2014	<0.015		38		0.0025	F /	<0.0002		<0.04		1.3	F /	<0.015[2]		4.9	F /	<0.015		<0.15	
		12/10/2014	<0.015		41		0.0044	F /	<0.0002		<0.04		0.81	F /	0.0017	F / B	4.5	F /	0.0011	F /	<0.15	

Table 3-2

Summary of Analytical Results - Target Analyte List Metals
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Analyte	Aluminum		Antimony		Arsenic		Barium		Cadmium		Calcium		Chromium		Cobalt		Copper		Iron	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit(1)	100		0.024		0.2		NS		0.05		NS		1.0		NS		NS		5.0	
		Surface Water RG	NS		0.61		0.16		5		0.0023		NS		0.44		NS		0.026		1.0	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M13	*Upgradient*																					
	MW806	10/21/2014	<0.3		<0.02		0.0059	F / B	0.1		<0.005		83		<0.015		<0.015		0.0016	F /	0.36	
		11/19/2014	<0.3		0.0033	F /	<0.025		0.094		<0.005		77		<0.015		<0.015		<0.015		<0.1	
		12/16/2014	<0.3		<0.02		<0.025		0.1		<0.005		83		<0.015		<0.015		<0.015		<0.1	
	MW807	10/21/2014	<0.3		<0.02		<0.025		0.12		<0.005		230		<0.015		0.0012	F /	0.0034	F /	0.75	
		11/19/2014	<0.3	U / UJ	<0.02		<0.025		0.12		<0.005		230		<0.015		<0.015		0.002	F /	0.64	
		12/16/2014	<0.3		0.0032	F /	0.012	F / B	0.12		0.00061	F /	220		<0.015		<0.015		0.0016	F /	0.79	
	Downgradient																					
	MW126R	10/21/2014	<0.3		<0.02		<0.025		0.06		<0.005		74		<0.015		<0.015		0.0019	F /	0.14	
		11/19/2014	<0.3		<0.02		<0.025		0.063		<0.005		75		<0.015		<0.015		0.0042	F /	<0.1	
		12/16/2014	<0.3		<0.02		<0.025		0.059		<0.005		76		<0.015		<0.015		<0.015		0.038	F /
	MW362	10/21/2014	<0.3		<0.02		<0.025		0.053		<0.005		190		<0.015		0.0012	F /	0.0031	F /	<0.1	
		10/21/2014 (DUP)	<0.3		<0.02		<0.025		0.051		<0.005		190	/ J	<0.015		<0.015		0.0033	F /	0.023	F /
		11/19/2014	<0.3		0.0046	F /	<0.025		0.05		<0.005		190		<0.015		<0.015		<0.015		<0.1	
		11/19/2014 (DUP)	<0.3		<0.02		<0.025		0.052		<0.005		190		<0.015		<0.015		0.0014	F /	<0.1	
		12/16/2014	<0.3		<0.02		0.0076	F / B	0.055		<0.005		200		<0.015		<0.015		0.0018	F /	<0.1	
	MW808	10/20/2014	<0.3		<0.02		0.0049	F / B	0.059		0.00066	F /	200		<0.015		<0.015		0.0038	F /	<0.1	
		11/18/2014	<0.3		<0.02		<0.025		0.058		0.00051	F /	170		<0.015		0.0017	F /	<0.015		<0.1	
		12/15/2014	<0.3		<0.02		<0.025		0.061		<0.005		180		<0.015		0.0016	F /	0.0014	F /	<0.1	
	MW809	10/20/2014	<0.3		<0.02		<0.025		0.034		<0.005		45		0.0008	F /	<0.015		0.0018	F /	<0.1	
		11/18/2014	<0.3		<0.02		<0.025		0.03		<0.005		41		<0.015		<0.015		<0.015		0.035	F /
		12/15/2014	<0.3		<0.02		<0.025		0.028		<0.005		44		<0.015		<0.015		<0.015		<0.1	
	MW811	10/29/2014	0.44	/ J	0.0033	F /	<0.025		0.077		0.00086	F /	150	/ J	0.0023	F /	0.0018	F /	0.0058	F /	1	
		11/19/2014	0.065	F /	0.0034	F /	<0.025		0.071		<0.005		190		<0.015		0.0017	F /	0.0031	F /	0.17	
		12/16/2014	0.29	F /	<0.02		0.0082	F / B	0.074		<0.005		200		0.002	F /	<0.015		0.0039	F /	0.59	
M11	*Upgradient*																					
	MW802	12/11/2014	<0.3		<0.02		<0.025		0.057		0.00079	F /	130		0.0008	F /	<0.015		0.002	F /	<0.1	
	MW803	12/15/2014	<0.3		<0.02		<0.025		0.028		<0.005		47		0.0007	F /	<0.015		<0.015		<0.1	
	Downgradient																					
	MW333	12/15/2014	<0.3		<0.02		<0.025		0.084		<0.005		52		<0.015		<0.015		<0.015		<0.1	
	MW334	12/15/2014	<0.3		<0.02		<0.025		0.041		<0.005		93		<0.015		<0.015		<0.015		0.055	F /
	MW335	12/11/2014	<0.3		<0.02		0.0079	F /	0.038		0.00054	F /	200		0.0014	F /	0.0025	F /	<0.015		0.23	
		12/11/2014 (DUP)	<0.3		0.0034	F /	0.0073	F /	0.039		0.0005	F /	200		<0.015		0.0025	F /	0.0014	F /	0.21	
	MW336	12/11/2014	<0.3		<0.02		<0.025		0.025		0.00053	F /	140	/ J	<0.015		0.0014	F /	<0.015		0.17	
	MW804	12/11/2014	<0.3		0.0038	F /	0.0067	F /	0.032		0.00058	F /	140		<0.015		<0.015		<0.015		0.11	
	MW805	12/11/2014	<0.3		<0.02		0.012	F /	0.039		<0.005		120		0.0007	F /	<0.015		0.0014	F /	0.081	F /

		Analyte	Lead		Magnesium		Manganese		Mercury		Nickel		Potassium		Silver		Sodium		Vanadium		Zinc	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit(1)	0.1		NS		10		NS		NS		NS		0.511		NS		NS		10	
		Surface Water RG	0.064		NS		1.0		0.103		1.0		NS		0.005		NS		NS		1.0	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M13	*Upgradient*																					
	MW806	10/21/2014	<0.015		48		0.045		<0.0002		0.0015	F /	2.1	F /	<0.015		28		<0.015		<0.15	
		11/19/2014	<0.015		44		0.0091	F /	<0.0002		<0.04		1.8	F /	0.0013	F / B	26		<0.015		<0.15	
		12/16/2014	<0.015		45		0.0098	F /	<0.0002		<0.04		1.9	F /	<0.015		28		<0.015		<0.15	
	MW807	10/21/2014	<0.015		110		0.16		<0.0002		0.004	F /	9.5		<0.015		650		0.0017	F /	<0.15	
		11/19/2014	<0.015		110		0.15	/ J	<0.0002		0.0035	F /	9.2		0.001	F / B	620		0.0014	F /	0.0051	F / J
		12/16/2014	<0.015		99		0.14		<0.0002		0.0032	F /	9.5		<0.015		630		<0.015		<0.15	
	Downgradient																					
	MW126R	10/21/2014	<0.015		47		0.035		<0.0002		0.0015	F /	2.6	F /	<0.015		27		0.0012	F /	<0.15	
		11/19/2014	<0.015		46		0.0019	F /	<0.0002		0.0014	F /	2.4	F /	0.0014	F / B	27		<0.015		0.0059	F /
		12/16/2014	0.0027	F /	45	/ J	0.014		<0.0002		0.0015	F /	2.6	F /	<0.015		27		<0.015		<0.15	
	MW362	10/21/2014	<0.015		110		0.18		<0.0002		0.0067	F /	7.7		<0.015		330		0.0017	F /	<0.15	
		10/21/2014 (DUP)	<0.015		110		0.18		<0.0002		0.0067	F /	7.3		<0.015		320		0.0012	F /	<0.15	
		11/19/2014	<0.015		100		0.18		<0.0002		0.0058	F /	7		0.0018	F / B	360		<0.015		<0.15	
		11/19/2014 (DUP)	<0.015		110		0.19		<0.0002		0.006	F /	7.2		0.0017	F / B	370		<0.015		0.0045	F /
		12/16/2014	<0.015		110		0.21		<0.0002		0.0061	F /	7.6		<0.015		420		<0.015		<0.15	
	MW808	10/20/2014	<0.015		75		1.5		<0.0002		0.04		17		<0.015		120		0.0014	F /	<0.15	
		11/18/2014	<0.015		62		1.6		<0.0002		0.023	F /	17		<0.015		120		0.0011	F /	<0.15	
		12/15/2014	<0.015		65		1.7		<0.0002		0.023	F /	19		<0.015		110		<0.015		<0.15	
	MW809	10/20/2014	<0.015		34		0.0011	F /	<0.0002		0.0017	F /	3.2		<0.015		23		0.0011	F /	<0.15	
		11/18/2014	<0.015		31		0.005	F /	<0.0002		0.0015	F /	2.8	F /	<0.015		22		<0.015		0.005	F / B
		12/15/2014	<0.015		31		0.012		<0.0002		<0.04		2.7	F /	<0.015		22		<0.015		<0.15	
	MW811	10/29/2014	<0.015		86		0.11		<0.0002		0.01	F /	12		<0.015		260	/ J	0.0031	F / B	0.011	F /
		11/19/2014	<0.015		99		0.076		<0.0002		0.0056	F /	9.7		0.0014	F / B	370		<0.015		0.0094	F /
		12/16/2014	<0.015		110		0.088		<0.0002		0.0055	F /	8.8		<0.015		410		0.0021	F /	0.011	F /
M11	*Upgradient*																					
	MW802	12/11/2014	<0.015		64		0.019		<0.0002		0.0018	F /	2	F /	<0.015		30		0.0011	F /	<0.15	
	MW803	12/15/2014	<0.015		29		<0.01		<0.0002		0.0016	F /	7.6		<0.015		79		<0.015		<0.15	
	Downgradient																					
	MW333	12/15/2014	<0.015		35		0.0008	F /	<0.0002		<0.04		6.5		<0.015		43		<0.015		<0.15	
	MW334	12/15/2014	<0.015		58		0.56		<0.0002		0.0013	F /	4.8		<0.015		41		<0.015		<0.15	
	MW335	12/11/2014	<0.015		120		2		<0.0002		0.0038	F /	8.5		<0.015		61		0.0014	F /	0.0061	F /
		12/11/2014 (DUP)	<0.015		130		2.1		<0.0002		0.0037	F /	8.8		0.00099	F /	62		0.0012	F /	<0.15	
	MW336	12/11/2014	<0.015		94		0.33	/ J	<0.0002		0.0035	F /	4.8		<0.015		70		0.0012	F /	<0.15	
	MW804	12/11/2014	<0.015		87		0.04		<0.0002		0.0042	F /	1.2	F /	<0.015		24		0.0015	F /	<0.15	
	MW805	12/11/2014	<0.015		87		0.037		<0.0002		0.0016	F /	9.2		<0.015		110		<0.015		<0.15	

Footnotes:

(1) Project Action Limits (Remedial Goal {RG}) obtained from Worksheet #15 of Appendix B (QAPP) of the *Long Term Monitoring Plan* (Toltest, 2010). IEPA Class II groundwater standards for industrial uses are presented where Class I and Class II standards (potable and industrial uses, respectively) were both available.

(2) Reporting limit exceeded the surface water RG.

General Notes:

Site M11 not sampled during Second Quarter.
An abbreviated list of analytes is used for reporting based on historically detected and reported compounds.
mg/L = milligrams per liter
Bolded result indicates Project Action Limit (RG) exceedance
NS = No Standard
< = Result shows laboratory Method Reporting Limit for non-detected results
LF/VF = Lab Flag/Validation Flag
F = Concentration below the reported detection limit
J = Estimated concentration
UJ = Not detected, estimated detection limit
B = Blank contamination
DUP = Duplicate

Table 3-3

Summary of Analytical Results - Indicator Parameters
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	Nitrate		Sulfate	
		Units	mg/L		mg/L	
		Project Action Limit[1]	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M1		***In-Plume***				
	MW107	10/29/2014	NA		**16,000**	
		12/8/2014	NA		**16,000**	
	MW231	10/28/2014	NA		**35,000**	
		10/28/2014 (DUP)	NA		**30,000**	
		12/8/2014	NA		**34,000**	
	MW640	10/28/2014	NA		**6,300**	
		12/8/2014	NA		**5,500**	
	MW641	10/29/2014	NA		**690**	
		12/8/2014	NA		**650**	
	MW642	10/29/2014	NA		**420**	
		12/8/2014	NA		390	
		Early Warning				
	MW643	10/28/2014	NA		75	
		12/8/2014	NA		85	
		12/8/2014 (DUP)	NA		84	
	MW644	10/28/2014	NA		180	
		12/8/2014	NA		160	
		Compliance				
	MW645	10/27/2014	NA		110	
		12/8/2014	NA		**550**	
	MW646	10/27/2014	NA		120	
		12/8/2014	NA		**570**	
	MW648	10/28/2014	NA		32	
		12/8/2014	NA		32	
	MW649	10/28/2014	NA		150	
		12/8/2014	NA		**1500**	
	SW709	10/28/2014	NA		68	
		12/8/2014	NA		76	
M8		***In-Plume***				
	MW330	10/20/2014	NA		**570**	
		12/16/2014	NA		**580**	
M13		***Upgradient***				
	MW806	10/21/2014	0.16	F /	68	
		11/19/2014	0.15	F /	71	
		12/16/2014	0.17	F /	70	
	MW807	10/21/2014	<0.5		250	
		11/19/2014	<1		240	
		12/16/2014	0.063	F /	230	
		Downgradient				
	MW126R	10/21/2014	<0.5		55	
		11/19/2014	0.061	F /	57	
		12/16/2014	<0.5		68	
	MW362	10/21/2014	<0.5		270	
		10/21/2014 (DUP)	0.048	F /	260	
		11/19/2014	<0.5		260	
		11/19/2014 (DUP)	<0.5		260	
		12/16/2014	<0.5		260	
		12/16/2014 (DUP)	<0.5		250	
	MW808	10/20/2014	0.29	F / J	210	
		11/18/2014	<0.5		190	
		12/15/2014	0.15	F /	270	
	MW809	10/20/2014	0.078	F / J	14	/ J
		11/18/2014	0.042	F /	8.5	
		12/15/2014	<0.5		8.9	
	MW811	10/29/2014	<5		260	
		11/19/2014	0.62		220	
		12/16/2014	<0.5		220	

Table 3-3

Summary of Analytical Results - Indicator Parameters
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**Nitrate**		**Sulfate**	
		Units	mg/L		mg/L	
		Project Action Limit[1]	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M11	***Upgradient***					
	MW802	12/11/2014	0.092	F / B	200	
	MW803	12/15/2014	0.81		90	
	Downgradient					
	MW333	12/15/2014	0.19	F /	75	
	MW334	12/15/2014	0.22	F /	190	
	MW335	12/11/2014	<0.5		**480**	
	MW335	12/11/2014 (DUP)	<0.5		**490**	
	MW336	12/11/2014	0.1	F / B	340	
	MW804	12/11/2014	0.092	F / B	240	
	MW805	12/11/2014	<0.5		**450**	

Footnotes:

(1) Project Action Limits (Remedial Goal {RG}) obtained from Worksheet #15 of Appendix B (QAPP) of the *Long Term Monitoring Plan* (Toltest 2010). IEPA Class II groundwater standards for industrial uses are presented where Class I and Class II standards (potable and industrial uses, respectively) were both available.

General Notes:

Site M11 not sampled during Second Quarter.
mg/L = milligrams per liter
NS = No standard
NA = not analyzed
Bolded result indicates Project Action Limit (RG) exceedance
< = Result shows laboratory Method Reporting Limit for non-detected results
LF/VF = Lab Flag/Validation Flag
F = Concentration below the reported detection limit
B = Blank contamination
J = Estimated concentration
DUP = duplicate

Table 3-4

Summary of Analytical Results - Volatile Organic Compounds
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	Acetone		Benzene		Carbon disulfide		Chlorobenzene		Chloromethane		1,1-DCA		1,2-DCA		cis-1,2-DCE		Ethyl Benzene		MethCl		MEK		Naphthalene		PCE		Toluene		1,1,1-TCA		TCE		VC		Xylenes (total)	
		Units	μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L	
		Project Action Limit(1)	NS		25		NS		500		NS		3500		25		NS		1,000		NS		NS		NS		25		2,500		1,000		25		25		10,000	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13	***Upgradient***																																					
	MW806	10/21/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		11/19/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		12/16/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW807	10/21/2014	<10		<1		<2		<1		<2		1.5		<1		1.1		<1		<5		<6		<1		<1		<1		<1		0.19	F /	<1.5		<2	
		11/19/2014	<10		<1		<2		<1		<2		1.8		<1		1.3		<1		<5		<6		<1		<1		<1		<1		0.2	F /	<1.5		<2	
		12/16/2014	<10		<1		<2		<1		<2		2		<1		1.4		<1		<5		<6		<1		<1		<1		<1		0.19	F /	<1.5		<2	
	Downgradient																																					
	MW126R	10/21/2014	4.1	F / B	<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		11/19/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		12/16/2014	8	F /	<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW362	10/21/2014	3.7	F / B	<1		<2		<1		<2		0.46	F /	<1		<1		<1		<5		<6		<1		0.27	F /	<1		<1		<1		<1.5		<2	
		10/21/2014 (DUP)	6.5	F / B	<1		<2		<1		<2		0.48	F /	<1		0.16	F /	<1		<5		<6		<1		0.28	F /	<1		0.17	F /	<1		<1.5		<2	
		11/19/2014	<10		<1		<2		<1		<2		0.54	F /	<1		0.17	F /	<1		<5		<6		<1		0.3	F /	<1		0.19	F /	<1		<1.5		<2	
		11/19/2014 (DUP)	<10		<1		<2		<1		<2		0.54	F /	<1		0.18	F /	<1		<5		<6		<1		0.32	F /	<1		0.18	F /	<1		<1.5		<2	
		12/16/2014	<10		<1		<2		<1		<2		0.6	F /	<1		0.21	F /	<1		<5		<6		<1		0.29	F /	<1		0.18	F /	<1		<1.5		<2	
		12/16/2014 (DUP)	<10		<1		<2		<1		<2		0.59	F /	<1		0.21	F /	<1		<5		<6		<1		0.29	F /	<1		0.17	F /	<1		<1.5		<2	
	MW808	10/20/2014	3.6	F / B	<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		11/18/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		12/15/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW809	10/20/2014	3.7	F / B	<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		11/18/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		12/15/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW811	10/29/2014	<10		<1		<2		<1	U / UJ	<2		<1		<1		<1		<1		<5		<6		<1	U / UJ	<1		0.22	F / J	<1		<1		<1.5		<2	
		11/19/2014	<10		0.25	F /	<2		<1		<2		0.17	F /	<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		12/16/2014	<10		0.43	F /	<2		<1		<2		0.23	F /	<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
M11	***Upgradient***																																					
	MW802	12/11/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW803	12/15/2014	6.4	F /	<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	Downgradient																																					
	MW333	12/15/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW334	12/15/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW335	12/11/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		12/11/2014 (DUP)	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW336	12/11/2014	3.5	F /	<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW804	12/11/2014	<10		<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW805	12/11/2014	4.1	F /	<1		<2		<1		<2		<1		<1		<1		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	

Footnotes:

(1) Project Action Limits (Remedial Goal {RG}) obtained from Worksheet #15 of Appendix B (QAPP) of the Long Term Monitoring Plan (Toltest, 2010). IEPA Class II groundwater standards for industrial uses are presented where Class I and Class II standards (potable and industrial uses, respectively) were both available.

General Notes:

Site M11 not sampled during Second Quarter.
An abbreviated list of compounds analyzed is used for reporting based on historically detected and reported compounds.
μg/L = Micrograms Per Liter
Bolded result indicates Project Action Limit (RG) exceedance
DUP = Duplicate
NS = No Standard
< = Result shows laboratory method reporting limit for non-detected results
LF/VF = Lab Flag/Validation Flag
B = Blank contamination
U = Not detected
UJ = Not detected, estimated detection limit
F = Concentration below the reported detection limit

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
1,2-DCA = 1,2-Dichloroethane
cis-1,2-DCE = cis-1,2-Dichloroethene
MEK = Methyl Ethyl Ketone (2-butanone)
MethCl = Methylene Chloride
PCE = Tetrachloroethene
TCE = Trichloroethene
VC = Vinyl chloride

Table 3-5

Summary of Analytical Results - Semivolatile Organic Compounds
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	2,4-DNT		2,6-DNT		Naphthalene		NB		2-Methylnaphthalene		Phenol	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit(1)	0.42		0.42		NS		51		NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13	*Upgradient*													
	MW806	10/21/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		11/19/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		12/16/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW807	10/21/2014	<23		<23		<12		<23		<12		<12	
		11/19/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		12/16/2014	<19		<19		<9.6		<19		<9.6		<9.6	
	Downgradient													
	MW126R	10/21/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		11/19/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		12/16/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW362	10/21/2014	**3.4**	F /	<19		<9.5		<19		<9.5		<9.5	
		10/21/2014 (DUP)	**2.9**	F /	<19		<9.7		<19		<9.7		<9.7	
		11/19/2014	**4.4**	F /	<19		<9.5		<19		<9.5		<9.5	
		11/19/2014 (DUP)	**4.8**	F /	<19		<9.5		<19		<9.5		<9.5	
		12/16/2014	**4.8**	F /	<20		<10		<20		<10		<10	
		12/16/2014 (DUP)	**4.7**	F /	<19		<9.6		<19		<9.6		<9.6	
	Downgradient													
	MW808	10/20/2014	<19		<19		<9.6		<19		<9.6		<9.6	
		11/18/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		12/15/2014	<19		<19		<9.7		<19		<9.7		<9.7	
	MW809	10/20/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		11/18/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		12/15/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW811	10/29/2014	<19		<19		<9.6		<19		<9.6		<9.6	
		11/19/2014	<21		<21		<11		<21		<11		<11	
		12/16/2014	<19		<19		<9.5		<19		<9.5		<9.5	
M11	*Upgradient*													
	MW802	12/11/2014	<19		<19		<9.7		<19		<9.7		<9.7	
	MW803	12/15/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	Downgradient													
	MW333	12/15/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW334	12/15/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW335	12/11/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		12/11/2014 (DUP)	<19		<19		<9.5		<19		<9.5		<9.5	
	MW336	12/11/2014	<19		<19		<9.6		<19		<9.6		<9.6	
	MW804	12/11/2014	<22		<22		<11		<22		<11		<11	
	MW805	12/11/2014	<19		<19		<9.5		<19		<9.5		<9.5	

Footnotes:

(1) Project Action Limits (Remedial Goal {RG}) obtained from Worksheet #15 of Appendix B (QAPP) of the Long Term Monitoring Plan (Toltest/MWH, 2010). IEPA Class II groundwater standards for industrial uses are presented where Class I and Class II standards (potable and industrial uses, respectively) were both available.

General Notes:

See Table 3-1 for 2,4-DNT and 2,6-DNT results where the SVOC reporting limit exceeded the RG.
Site M11 not sampled during Second Quarter.
An abbreviated list of compounds analyzed is used for reporting based on historically detected and reported compounds.
< = Result shows laboratory method reporting limit for non-detected results
µg/L = Micrograms Per Liter
2,4-DNT = 2,4-Dinitrotoluene
2,6-DNT = 2,6-Dinitrotoluene
Bolded result indicates Project Action Limit (RG) exceedance
DUP = Duplicate
F = Concentration below the reported detection limit
LF/VF = Lab Flag/Validation Flag
NB = Nitrobenzene
NS = No Standard

Table 3-6

Summary of Groundwater Trends: Estimated Clean-Up Times
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Critical Monitoring Well	Critical Compound	Initial [1] Concentration (µg/L)	Date of Initial Concentration	Final Concentration (µg/L) (Remediation Goal - RG)	Record of Decision Estimated Clean-Up time for Site (yrs)	R^2 Value[2]	Estimated Clean-Up Time (yrs)	Estimated Clean-Up Date (yr)	Source Removal Completion Date
LAP AREA										
L1	MW131	2,4,6-TNT	11,000	2009	9.5	340	0.0047	**271**	2285	2006
		1,3,5-TNB	4,200	2007	5.1		0.0646	**19**	2033	2006
	MW173	RDX	15	2007	2.6		0.2538	**5**	2019	2006
		2,4,6-TNT	20	2009	9.5		0.0172	**5**	2019	2006
L2	MW404	RDX	270	2006	2.6	20	0.1461	**34**	2048	2007
L3	MW412	RDX	440	2008	2.6	50	0.551	**22**	2036	2008
	MW630	RDX	13	2011	2.6		0.1871	*	*	2008
	MW633	RDX	390	2008	2.6		0.4269	**8**	2022	2008
L14	MW511	RDX	170	2007	2.6	80	0.0675	**108**	2122	2005
	MW512	RDX	400	2011	2.6		0.1842	**43**	2057	2005
MANUFACTURING AREA										
M1	MW107	Sulfate	49,000	2009	400	NC	0.1538	**61**	2075	2008
	MW231	Sulfate	41,000	2010	400		0.0862	**419**	2433	2008
	MW640	Sulfate	6,800	2013	400		0.4065	*	*	2008
	MW641	Sulfate	1,300	2010	400		0.1732	**28**	2042	2008
	MW642	Sulfate	460	2010	400		0.1248	**15**	2029	2008
MFG	MW212R	2,4-DNT	17,000	2005	0.42	50	0.000008	**4835**	6849	2005
		2,6-DNT	3,500	2005	0.42		0.0008	*	*	2005
		2-NT	81,000	2005	5,100		0.0317	**4**	2018	2005
		2,4,6-TNT	1,300	2013	9.5		0.00008	*	*	2005
	MW652	2,4,6-TNT	3,400	2005	9.5		0.1743	**45**	2059	2005
		2,4-DNT	10,000	2005	0.42		0.0358	**267**	2281	2005
		2,6-DNT	5,400	2005	0.42		0.0876	**121**	2135	2005
		2-NT	98,000	2005	5,100		0.1453	**18**	2032	2005
	MW330	Sulfate	590	2013	400		0.0105	*	*	2003[3]
	MW318	2,6-DNT	6.7	2004	0.42		0.1820	**9**	2023	2005
M13	MW362	2,4-DNT	7.5	2011	0.42	NC	0.3651	*	*	2008
M11	MW335	Sulfate	1,300	2008	400	NC	0.1429	**5**	2019	2008
	MW336	Sulfate	710	2013	400		0.0002	*	*	2008
	MW805	Sulfate	590	2008	400		0.5905	**6**	2020	2008

Note:

Indicates that R^2 value less than 0.1 and/or clean-up time could not be calculated.

Bolded value represents the estimated cleanup time for the associated site.

Estimated clean-up times are approximate and based on constant contamination reduction rates for a specific compound at a specific point within the aquifer.

* = Trend curve indicates increasing concentrations. An estimated clean-up time or corresponding date could not be calculated.

µg/L = micrograms per liter (milligrams per liter {mg/L} for sulfate).

NC = Not calculated

RG = Remediation Goal

yr(s) = year(s)

1,3,5-TNB = 1,3,5-Trinitrobenzene
2,4,6-TNT = 2,4,6-Trinitrotoluene
2,4-DNT = 2,4-Dinitrotoluene
2,6-DNT = 2,6-Dinitrotoluene
2-NT = 2-Nitrotoluene
RDX = Royal Demolition Explosive

Footnotes:

(1) Initial concentration is the maximum observed concentration during the timeframe included.

(2) The R^2 value represents an indicator of how well the equation resulting from the regression analysis explains the relationship among the variables. Shaded analysis results with and R^2 value less than 0.1 are unreliable.

(3) First data point used from October 2003. RA assumed completed in 2003.

Table 3-7

Groundwater Horizontal Gradients
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	2nd Quarter - October 2014				
	Well Number Groundwater Elevation (ft MSL)	**Well Number** Groundwater Elevation (ft MSL)	**Head Difference (ft)**	**Horizontal Separation (ft)**	**Horizontal Gradient**
LAP AREA					
L1	MW176	MW173			L1 (North)
	625.04	607.01	18.03	1620	0.0111
	MW611	MW610			L1 (South)
	611.49	605.53	5.96	420	0.0142
L2(1)	MW135	MW404			
	NM	**NM**	**NM**	1500	**NM**
L3/ Landfill L3	MW1	MW410			
	613.74	589.98	23.76	780	0.0305
L14(2)	MW508	MW603			
	NM	**NM**	**NM**	780	**NM**
MANUFACTURING AREA					
M1	MW107	MW643			
	545.56	534.00	11.56	300	0.0385
MFG - M6	MW650	MW165			M6 (North)
	555.72	538.29	17.43	937.5	0.0186
	MW309	MW160			M6 (South)
	554.31	535.63	18.68	780	0.0239
MFG - M7	MW307	MW216			
	543.96	531.76	12.20	1237.5	0.0099
MFG - M8	MW127R	MW323R			
	553.87	555.41	1.54	3960	0.0004
MFG - M13	AEHA14R	MW126R			
	553.46	547.08	6.38	2025	0.0032
Landfill M11(3)	MW802	MW804			
	NM	**NM**	**NM**	1030	**NM**

Site	3rd Quarter - Novemeber 2014				
	Well Number Groundwater Elevation (ft MSL)	**Well Number** Groundwater Elevation (ft MSL)	**Head Difference (ft)**	**Horizontal Separation (ft)**	**Horizontal Gradient**
LAP AREA					
L1	MW176	MW173			L1 (North)
	NM	**NM**	**NM**	1620	**NM**
	MW611	MW610			L1 (South)
	NM	**NM**	**NM**	420	**NM**
L2(1)	MW135	MW404			
	NM	**NM**	**NM**	1500	**NM**
L3/ Landfill L3	MW1	MW410			
	NM	**NM**	**NM**	780	**NM**
L14(2)	MW508	MW603			
	NM	**NM**	**NM**	780	**NM**
MANUFACTURING AREA					
M1	MW107	MW643			
	NM	**NM**	**NM**	300	**NM**
MFG - M6	MW650	MW165			M6 (North)
	NM	**NM**	**NM**	937.5	**NM**
	MW309	MW160			M6 (South)
	NM	**NM**	**NM**	780	**NM**
MFG - M7	MW307	MW216			
	NM	**NM**	**NM**	1237.5	**NM**
MFG - M8	MW127R	MW323R			
	NM	**NM**	**NM**	3960	**NM**
MFG - M13	AEHA14R	MW126R			
	552.65	547.03	5.62	2025	0.0028
Landfill M11(3)	MW802	MW804			
	NM	**NM**	**NM**	1030	**NM**

Site	4th Quarter - December 2014				
	Well Number Groundwater Elevation (ft MSL)	**Well Number** Groundwater Elevation (ft MSL)	**Head Difference (ft)**	**Horizontal Separation (ft)**	**Horizontal Gradient**
LAP AREA					
L1	MW176	MW173			L1 (North)
	624.66	606.63	18.03	1620	0.0111
	MW611	MW610			L1 (South)
	612.02	605.56	6.46	420	0.0154
L2(1)	MW135	MW404			
	631.42	602.38	29.04	1500	0.0194
L3/ Landfill L3	MW1	MW410			
	613.64	592.18	21.46	780	0.0275
L14(2)	MW508	MW603			
	578.43	572.20	6.23	780	0.0080
MANUFACTURING AREA					
M1	MW107	MW643			
	545.83	533.98	11.85	300	0.0395
MFG - M6	MW650	MW165			M6 (North)
	555.26	538.24	17.02	937.5	0.0182
	MW309	MW160			M6 (South)
	553.83	535.62	18.21	780	0.0233
MFG - M7	MW307	MW216			
	543.76	532.11	11.65	1237.5	0.0094
MFG - M8	MW127R	MW323R			
	553.53	554.35	0.82	3960	0.0002
MFG - M13	AEHA14R	MW126R			
	552.58	546.94	5.64	2025	0.0028
Landfill M11(3)	MW802	MW804			
	536.7	531.79	4.91	1030	0.0048

General Notes:
ft = feet
MSL = mean sea level
NM = Not Measured
LAP = Load-Assemble-Package Area Sites
MFG = Manufacturing Area Sites

Footnotes:
(1) Site L2 is not sampled during 2nd Quarter.
(2) Site L14 is not sampled during 2nd Quarter.
(3) Site M11 is not sampled during 2nd Quarter.

Table 3-8

Groundwater Flow Velocities
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Average K (cm/sec)	Effective Porosity	2nd Quarter - October 2014 Horizontal Gradient	2nd Quarter - October 2014 Velocity (cm/sec)	2nd Quarter - October 2014 Velocity (ft/day)	2nd Quarter - October 2014 Velocity (ft/year)	3rd Quarter - November 2014 Horizontal Gradient	3rd Quarter - November 2014 Velocity (cm/sec)	3rd Quarter - November 2014 Velocity (ft/day)	3rd Quarter - November 2014 Velocity (ft/year)	4th Quarter - December 2014 Horizontal Gradient	4th Quarter - December 2014 Velocity (cm/sec)	4th Quarter - December 2014 Velocity (ft/day)	4th Quarter - December 2014 Velocity (ft/year)
LAP AREA														
L1(1)	9.2E-06	0.3	0.0127	0.0000004	0.001	0.4	**NM**	**NM**	**NM**	**NM**	0.0133	0.0000004	0.001	0.4
L2(2)	1.6E-03	0.3	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	0.0194	0.0001	0.3	107.0
L3/Landfill L3(3)	1.6E-03	0.3	0.0305	0.0002	0.5	168.3	**NM**	**NM**	**NM**	**NM**	0.0275	0.0001	0.4	151.7
L14(2)	1.6E-03	0.3	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	0.0080	0.00004	0.1	44.1
MANUFACTURING AREA														
M1	6.6E-05	0.3	0.0385	0.00001	0.02	8.8	**NM**	**NM**	**NM**	**NM**	0.0395	0.000009	0.02	9.0
M6(4)	8.6E-04	0.3	0.0213	0.0001	0.2	63.0	**NM**	**NM**	**NM**	**NM**	0.0208	0.00006	0.2	61.5
M7	6.7E-04	0.3	0.0099	0.00002	0.06	22.9	**NM**	**NM**	**NM**	**NM**	0.0094	0.00002	0.1	21.7
M8(5)	8.6E-04	0.3	0.0004	0.000001	0.003	1.2	**NM**	**NM**	**NM**	**NM**	0.0002	0.000001	0.002	0.6
Landfill M13	8.0E-02	0.3	0.0032	0.0009	2.4	882.7	0.003	0.0007	2.1	772.3	0.0028	0.0007	2.1	772.3
Landfill M11(2, 6)	6.7E-04	0.3	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	0.0048	0.00001	0.03	11.1

General Notes:

Hydraulic conductivity values are averages for the overburden aquifer.

Horizontal gradients are calculated using water table elevation data.

cm/sec = centimeters per second

ft = feet

K = Hydraulic conductivity

MFG = Manufacturing Area Sites

NM = Water level not measurerd

Footnotes:

(1) Average of north and south gradients at L1 used .

(2) Sites L2, L14, and M11 are not sampled during the 2nd Quarter.

(3) No hydraulic conductivity data were available for Site L3 or Site L14. Values used are from nearby Site L2.

(4) Average of north and south gradients at M6 used.

(5) No hydraulic conductivity data were available for Site M8. Values used are from nearby Site M6.

(6) No hydraulic conductivity data were available for Site M11 Landfill. Value used is from nearby Site M7.

Table 3-9

Vertical Gradient Calculations
2014 Annual Groundwater Monitoring Report
Joliet Army Ammuntion Plant
Will County, Illinois

Site ID	Well ID	Ground Elevation (ft MSL)	Depth (ft) to top of screen (from ground)	Depth (ft) to bottom of screen (from ground)	Screen Length (feet)	Elevation of Screen Midpoint (ft MSL)	Groundwater Elevation 10/14 (ft MSL)	Vertical Gradient 10/14 (ft/ft)	Groundwater Elevation 11/14 (ft MSL)	Vertical Gradient 11/14 (ft/ft)	Groundwater Elevation 12/14 (ft MSL)	Vertical Gradient 12/14 (ft/ft)
LAP AREA												
L1							**Overburden to Bedrock**					
	MW178	640.39	27.3	46.5	19.2	603.49	618.99	-0.2807	**NM**	**NM**	618.22	-0.3042
	MW176	643.49	4.8	20.8	16.0	630.69	625.04		**NM**		624.66	
	MW172	613.19	14.5	34.5	20.0	588.69	**NM**	**NA**	**NM**	**NM**	606.72	0.0050
	MW173	612.56	2.8	11.8	9.0	605.26	607.01		**NM**		606.63	
	MW177	613.84	11.8	31.0	19.2	592.44	608.22	0.0464	**NM**	**NM**	608.06	**NA**
	MW171	615.03	2.9	7.9	5.0	609.63	607.52		**NM**		**DRY**	
	MW401	610.2	28.5	43.5	15.0	574.20	605.48	-0.0016	**NM**	**NM**	605.94	0.0121
	MW610	609.62	4.0	14.0	10.0	600.62	605.53		**NM**		605.56	
L2							**Overburden to Bedrock**					
	MW621	602.41	22.0	32.0	10.0	575.41	**NM**	**NM**	**NM**	**NM**	601.45	-0.0773
	MW620(1)	602.41	7.0	17.0	10.0	590.41	**NM**		**NM**		602.61	
L3/ Landfill L3							**Bedrock to Bedrock**					
	MW631	592.23	16.0	26.0	10.0	571.23	590.45	0.1207	**NM**	**NM**	590.62	0.1319
	MW630	592.23	7.0	12.0	5.0	582.73	588.38		**NM**		588.36	
L14							**Overburden to Bedrock**					
	MW602	581.22	21.0	31.0	10.0	555.22	**NM**	**NM**	**NM**	**NM**	573.88	-0.0853
	H-7	581.45	4.0	14.0	10.0	572.45	**NM**		**NM**		575.62	
							Combination to Bedrock					
	MW604	578.27	20.0	30.0	10.0	553.27	**NM**	**NM**	**NM**	**NM**	572.47	0.0143
	MW603	578.27	6.0	16.0	10.0	567.27	**NM**		**NM**		572.20	
MANUFACTURING AREA												
M1							**Overburden to Bedrock**					
	MW640	545.4	29.0	39.0	10.0	511.40	543.92	0.0169	**NM**	**NM**	544.17	0.0149
	MW351	545.68	9.5	19.5	10.0	531.18	543.38		**NM**		543.69	
	MW642	545.08	29.0	39.0	10.0	511.08	541.52	-0.0187	**NM**	**NM**	541.78	-0.0167
	MW641	545.08	7.0	17.0	10.0	533.08	542.10		**NM**		542.30	
	MW644	540.23	10.8	20.4	9.6	524.63	534.02	0.0021	**NM**	**NM**	534.26	0.0299
	MW643	540.03	4.3	7.2	2.9	534.28	534.00		**NM**		533.98	
	MW646	541.48	12.3	21.9	9.6	524.38	533.01	0.0189	**NM**	**NM**	533.10	0.0163
	MW645	541.47	7.5	11.5	4.0	531.97	532.85		**NM**		532.96	
M4							**Combination to Bedrock**					
	MW158	531.58	9.0	29.5	20.5	512.33	531.38	-0.0155	**NM**	**NM**	531.36	-0.0397
	MW157(1)	531.37	3.7	10.2	6.5	524.42	531.68		**NM**		531.84	
M6							**Overburden to Bedrock**					
	MW320R	554.6	30.5	45.5	15.0	516.60	545.17	0.0074	**NM**	**NM**	544.86	0.0053
	MW166R	555.6	10.0	20.0	10.0	540.60	544.96		**NM**		544.71	
	MW651	563.83	36.0	46.0	10.0	522.83	548.90	-0.2074	**NM**	**NM**	548.53	-0.2075
	MW650	563.83	12.0	22.0	10.0	546.83	555.72		**NM**		555.26	
	MW653	561.93	36.0	46.0	10.0	520.93	547.09	-0.1998	**NM**	**NM**	546.55	-0.2041
	MW652	561.93	11.0	21.0	10.0	545.93	553.62		**NM**		553.12	
	MW215R	565.30	38.5	53.5	15.0	519.30	546.27	-0.2021	**NM**	**NM**	545.77	-0.2020
	MW212R	565.30	9.5	19.5	10.0	550.80	553.10		**NM**		552.47	
	MW213R	564.30	38.0	53.0	15.0	518.80	547.26	-0.2149	**NM**	**NM**	546.72	-0.2155
	MW210R	564.30	10.7	20.0	9.3	548.95	555.05		**NM**		554.39	
	MW310R	563.00	44.5	59.5	15.0	511.00	543.29	-0.2544	**NM**	**NM**	542.72	-0.2594
	MW309	563.43	12.7	27.7	15.0	543.23	554.31		**NM**		553.83	
	MW308	561.38	50.5	65.5	15.0	503.38	541.87	-0.0515	**NM**	**NM**	541.68	-0.0515
	MW307	561.45	17.0	27.0	10.0	539.45	543.96		**NM**		543.76	
							Combination to Bedrock					
	MW123R	534.90	15.0	30.0	15.0	512.40	532.06	-0.1266	**NM**	**NM**	532.02	-0.1376
	MW162R	537.70	4.5	9.5	5.0	530.70	534.91		**NM**		535.15	
	MW123R	534.90	15.0	30.0	15.0	512.40	532.06	-0.1266	**NM**	**NM**	532.02	-0.1376
	MW162R	537.70	4.5	9.5	5.0	530.70	534.91		**NM**		535.15	

RJR/rjr/BTB/CRS
J:\JOLIET 2014\2014 Annual GW Monitoring Report\Final\Tables\Table 3-9 Vert Grads

Table 3-9

Vertical Gradient Calculations
2014 Annual Groundwater Monitoring Report
Joliet Army Ammuntion Plant
Will County, Illinois

Site ID	Well ID	Ground Elevation (ft MSL)	Depth (ft) to top of screen (from ground)	Depth (ft) to bottom of screen (from ground)	Screen Length (feet)	Elevation of Screen Midpoint (ft MSL)	Groundwater Elevation 10/14 (ft MSL)	Vertical Gradient 10/14 (ft/ft)	Groundwater Elevation 11/14 (ft MSL)	Vertical Gradient 11/14 (ft/ft)	Groundwater Elevation 12/14 (ft MSL)	Vertical Gradient 12/14 (ft/ft)
M6						**Bedrock to Bedrock**						
	MW312[(1)]	545.96	40.0	55.0	15.0	498.46	548.43	-0.0010	**NM**	**NM**	547.57	0.0003
	MW311	546.36	14.0	24.0	10.0	527.36	548.46		**NM**		547.56	
	MW319	545.49	40.0	55.0	15.0	497.99	537.79	0.0051	**NM**	**NM**	537.62	0.0053
	MW318	545.23	11.8	21.8	10.0	528.43	537.59		**NM**		537.41	
	MW313	549.20	25.0	40.0	15.0	516.70	539.07	0.0173	**NM**	**NM**	538.84	0.0207
	MW654	548.49	13.0	23.0	10.0	530.49	538.69		**NM**		538.39	
	MW317[(1)]	540.71	34.0	49.0	15.0	499.21	536.25	0.0997	**NM**	**NM**	536.23	-0.0151
	MW316	540.49	13.0	18.0	5.0	524.99	533.68		**NM**		536.62	
	MW315[(1)]	538.91	29.7	44.7	15.0	501.71	535.50	0.0016	**NM**	**NM**	535.38	0.0016
	MW314	539.53	9.7	14.7	5.0	527.33	535.46		**NM**		535.34	
M7						**Overburden to Overburden**						
	MW661	537.09	20.0	30.0	10.0	512.09	532.65	-0.0547	**NM**	**NM**	532.57	-0.0567
	MW660	537.08	7.0	12.0	5.0	527.58	533.84		**NM**		533.80	
						Overburden to Bedrock						
	MW217	536.90	19.5	34.5	15.0	509.90	533.00	0.0567	**NM**	**NM**	533.10	0.0446
	MW216	536.51	5.0	10.0	5.0	529.01	531.76		**NM**		532.11	
Landfill M13						**Overburden to Bedrock**						
	MW807	563.79	35.0	45.0	10.0	523.79	550.54	-0.0614	550.17	-0.0027	549.93	-0.0526
	MW806	563.73	15.0	25.0	10.0	543.73	552.29		551.65		551.38	
	MW809	567.28	35.0	45.0	10.0	527.28	549.84	-0.1051	549.20	-0.0047	549.17	-0.1025
	MW808	567.33	15.0	25.0	10.0	547.33	552.49		551.81		551.67	
	MW364	567.69	37.0	42.0	5.0	528.19	541.93	-0.0065	541.52	-0.0003	541.44	-0.0090
	MW363	567.66	21.0	31.0	10.0	541.66	542.02		541.67		541.56	
						Overburden to Combination						
	MW362	562.78	28.0	33.0	5.0	532.28	549.59	0.1696	549.14	0.0039	548.91	0.1344
	MW126R	563.00	11.0	21.0	10.0	547.00	547.08		547.03		546.94	
						Bedrock to Bedrock						
	MW322[(1)]	542.26	34.5	49.5	15.0	500.26	533.67	-0.1605	**NM**	**NM**	536.28	-0.1407
	MW321	542.93	13.5	23.5	10.0	524.43	537.55		**NM**		539.68	
Landfill M11						**Combination to Bedrock**						
	MW803	541.56	26.5	36.5	10.0	510.06	**NM**	**NM**	**NM**	**NM**	541.09	0.1648
	MW802	541.62	5.0	15.0	10.0	531.62	**NM**		**NM**		536.70	
						Bedrock to Bedrock						
	MW805[(1)]	533.62	25.0	35.0	10.0	503.62	**NM**	**NM**	**NM**	**NM**	525.19	-0.3274
	MW804	533.78	5.0	15.0	10.0	523.78	**NM**		**NM**		531.79	

General Notes:

Water Level in Deep Well **-** Water Level in Shallow Well
Vertical Gradient = **---**
ABS (Water Table Elevation **-** Screen Midpoint of Deep Well)

Negative vertical gradients indicate downward flow, positive indicates upward flow.
ft = feet
ft/ft = feet per foot
ID = identification
MSL = mean sea level
NA - well dry. Therfore, vertical gradient could not be calculated.
NM = not measured

Footnotes:
(1) For well nests with no water table well with top of screen for the shallow well below water elevation:

Water Level in Deep Well **-** Water Level in Shallow Well
Vertical Gradient = **---**
ABS (Screen Midpoint in Shallow Well **-** Screen Midpoint of Deep Well)

Table 3-10

Proposed Sampling Plan - Spring and Fall 2015 Semi-annual Sampling
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well ID	Parameter
L1	***In-plume***	
	MW131	E
	MW173	E
	WES1	E
	Early Warning	
	WES3	E
	MW174	E
	Compliance	
	SW550	E
L2[(1)]	***In-plume***	
	MW404	E
	Early Warning	
	MW620	E
	Compliance	
	MW621	E
	SW555	E
L3/ Landfill L3	***Upgradient***	
	SW0004[(2)]	E, M
	In-plume/Downgradient	
	MW410	E
	MW412	E, M
	Early Warning/Downgradient	
	MW630	E, M
	MW631	E, M
	MW633	E, M
	Compliance/Downgradient	
	SW777	E, M
	Downgradient	
	SW557	E, M
	SW558	E, M
L14[(1)]	***In-plume***	
	MW511	E
	MW512	E
	Early Warning	
	H7	E
M1	***In-plume***	
	MW107	S
	MW231	S
	MW640	S
	MW641	S
	MW642	S
	Early Warning	
	MW643	S
	MW644	S
	Compliance	
	MW645	S
	MW646	S
	MW648	S
	MW649	S
	SW709	S

Table 3-10

Proposed Sampling Plan - Spring and Fall 2015 Semi-annual Sampling
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well ID	Parameter
MFG	***In-plume***	
	MW212R	E
	MW330	S
	MW652	E
	Early Warning	
	MW123R	E
	MW124R	E
	MW162R	E
	MW313	E
	MW318	E
	MW319	E
	MW654	E
	Compliance	
	MW117	E
	MW118	E
	MW119	E
Landfill M11(1)	***Upgradient***	
	MW802	E, I, M, SVOC & V
	MW803	E, I, M, SVOC & V
	Downgradient	
	MW333	E, I, M, SVOC & V
	MW334	E, I, M, SVOC & V
	MW335	E, I, M, SVOC & V
	MW336	E, I, M, SVOC & V
	MW804	E, I, M, SVOC & V
	MW805	E, I, M, SVOC & V
Landfill M13	***Upgradient***	
	MW806	E, I, M, SVOC & V
	MW807	E, I, M, SVOC & V
	Downgradient	
	MW126R	E, I, M, SVOC & V
	MW362	E, I, M, SVOC & V
	MW808	E, I, M, SVOC & V
	MW809	E, I, M, SVOC & V
	MW811	E, I, M, SVOC & V

General Notes:
E = Explosives
M = Target Analyte List Metals
S = Sulfate
MFG = Manufacturing Area
I = Indicator parameters (Nitrate-N and Sulfate)
SVOC = Semivolatile organic compounds
V = Volatile Organic Compounds (VOCs)

Footnotes:
(1) Fall semi-annual round only.
(2) Sampled only in spring when upstream Site L2 is not sampled.

TABLE 4-1

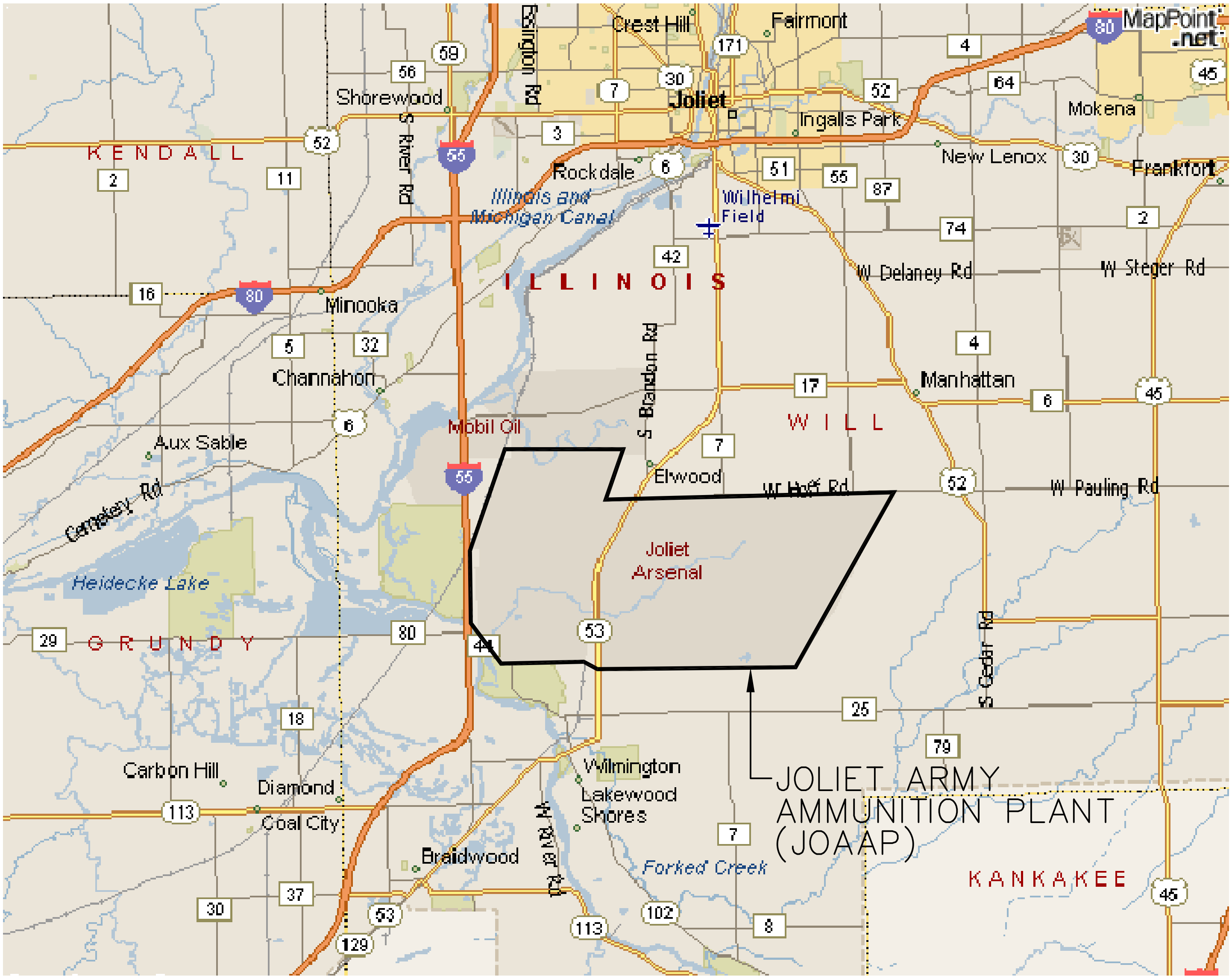
Summary of Recommendations
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Report	Recommendation	Reasoning	Status Initiated/Pending
2009 Semi-annual			
	No recommendations regarding the monitoring program		
2009 Annual			
	Fall Sampling only at L2	Section 4.1.2.5 of LTM Plan, round with highest concentration	Initiated, Site L2 will not be sampled spring 2012
	Remove TAL metals analysis from Site L3 well MW410	No metals exceedances since sampling re-initiated in spring 2008	Initiated, metals at well MW410 were not sampled beginning fall 2011
	Remove Site M5 well MW207R from monitoring program	Section 4.1.7.4 of LTM Plan, no RG exceedances for 4 rounds	Initiated, well MW207R was not sampled beginning fall 2011
	Remove Site M3 wells MW233 and MW352 from monitoring program	Section 4.1.6.5 of LTM Plan, no RG exceedances for 4 rounds	Initiated, wells MW233 and MW352 were not sampled beginning fall 2011
	Prepare closure report for Site M3	Section 4.1.6.6 of LTM Plan, no RG exceedances for 4 rounds	Closure Report will be prepared in 2013
2010 Semi-annual			
	Remove Site L2 well MW501 from monitoring program	Section 4.1.2.5 of LTM Plan, no RG exceedances for 4 rounds	Initiated, well MW501 was not sampled fall beginning 2011
	Fall Sampling only at L14	Section 4.1.4.5 of LTM Plan, round with highest concentration	Initiated, Site L14 will not be sampled spring 2012
	Prepare closure report for Site M5	Section 4.1.7.4 of LTM Plan, no RG exceedances for 4 rounds	Closure Report will be prepared in 2013
	Remove cadmium analysis from Site M6 well MW123R	Section 4.1.7.4 of LTM Plan, no cadmium detections	Initiated, cadmium at well MW123R was not analyzed beginning fall 2010
2010 Annual			
	Remove Site L1 compliance well MW401 from monitoring program	No explosives detections. Site has upgradient early warning wells with no detections	Initiated, well MW401 will not be sampled beginning spring 2012
	Remove Site L1 early warning well MW172 from monitoring program	Well MW172 redundant with well MW173, upward vertical gradients	Initiated, well MW172 will not be sampled beginning spring 2012
	Change designation of Site L1 well MW173 to in-plume	Migration of contaminants	Initiated in 2011 Annual Report
	Remove Site L2 compliance well MW810 from monitoring program	No explosives detections. Site had upgradient early warning wells with no detections	Initiated, L2 is no longer sampled in spring and well MW810 will not be sampled in fall 2012
	Remove Site L3 compliance well MW632 from monitoring program	No explosives detections. Hydraulics suggest well not within migration flowpath	Initiated, well MW632 will not be sampled beginning spring 2012
	Change designation of Site M1 wells MW640, MW641, and MW642 to in-plume	Migration of contaminants	Initiated in 2011 Annual Report
	Remove Site M8 in-plume well MW148RR from monitoring program	In-plume well with no sulfate exceedances since spring 2009	Initiated, well MW148RR will not be sampled beginning spring 2012
	Remove Site M13 wells AEHA14R and AEHA15 from monitoring program and abandon	Problematic wells	Initiated, wells AEHA14R and AEHA15 will not be sampled beginning spring 2012
2011 Semi-annual			
	No new recommendations		
2011 Annual			
	At Site L3/Landfill L3 sample SW004 in spring only	Upstream sample SW555 provides data for fall rounds	Initiated, SW004 will no longer sampled in fall when Site L2 is sampled
	Remove Site Landfill L3/Landfill L3 upgradient well MW03 from monitoring program	No RG exceedances at Site L3 in-plume well MW410	Initiated, well MW03 will not be sampled beginning spring 2012
	Remove Site L14 in-plume well MW508 from monitoring program	No RG exceedances	Initiated, well MW508 will not be sampled beginning spring 2012
	Remove Site L14 compliance wells MW603 and MW604 from monitoring program	Redundant, no RG exceedances in early warning well H7	Initiated, wells MW603 and MW604 will not be sampled beginning spring 2012
	Remove MFG compliance wells MW115 and MW116 from monitoring program	Redundant, no RG exceedances in upgradient Site M6 early warning wells MW123R and MW162R or Site M7 early warning well MW124R	Initiated, wells MW115 and MW116 will not be sampled beginning spring 2012
	Remove MFG compliance wells MW112 and MW113 from monitoring program	Removal of upgradient Site M5 in-plume well MW207R from monitoring program and Site M5 closure	Initiated, wells MW112 and MW113 will not be sampled beginning spring 2012
	Prepare closure report for Site M8	Removal of in-plume well MW148RR from monitoring program	Closure Report will be prepared in 2013
	Fall Sampling only at M11	Section 4.2.2.5 of LTM Plan, stable and predictable results	Initiated spring 2013. Monitoring wells MW333, MW334, MW803, and MW804 were not sampled in spring 2012.
2012 Semi-annual			
	Install monitoring well downgradient of Site M13 to replace monitoring wells AEHA 14R and AEHA15	Intended to replace monitoring wells AEHA 14R and AEHA15 which were removed from the monitoring program	Pending, monitoring well will be installed following completion of Work Plan Addendum
2012 Annual			
	No new recommendations		
2013 Semi-annual			
	Abandon two unidentified monitoring wells identified at Site M4 and Site M6.	Wells unidentified and not included in monitoring program	Pending
2013 Annual			
	Continue quarterly landfill cap inspections at Landfill M11 through 2014	October 2013 landfill inspection report missing.	Completed
	Do not abandon monitoring well AEHA14R as previously recommended by IEPA	Provides water level control point for Site M13.	Completed
	Redesignate Site L1 monitoring well MW171 from bedrock to overburden	Bottom of the well screen at 7.9 ft bgs and top of bedrock at 8.0 ft bgs.	Completed
	Redesignate Site L14 monitoring well MW603 from overburden to combination	Bottom of the well screen at 16.0 ft bgs and top of bedrock at 13.0 ft bgs.	Completed
	Redesignate Site M1 monitoring well MW642 from overburden to bedrock	Top of the well screen at 29.0 ft bgs and top of bedrock at 29.0 ft bgs.	Completed
	Redesignate Site M1 monitoring well MW647 from overburden to bedrock	Top of the well screen at 7.3 ft bgs and top of bedrock at 6.0 ft bgs.	Completed
	Redesignate Site M1 monitoring well MW649 from overburden to combination	Top of the well screen at 7.0 ft bgs and top of bedrock at 7.5 ft bgs.	Completed
	Redesignate Site M3 monitoring well MW154 from bedrock to combination	Bottom of the well screen at 9.1 ft bgs and top of bedrock at 8.0 ft bgs.	Completed
	Redesignate Site M5 monitoring well MW354R from combination to overburden	Bottom of the well screen at 17.0 ft bgs and top of bedrock at 19.0 ft bgs.	Completed
	Redesignate Site M6 monitoring well MW162R from overburden to bedrock	Top of the well screen at 3.7 ft bgs and top of bedrock at 4.5 ft bgs.	Completed
	Redesignate Site M6 monitoring well MW320R from overburden to bedrock	Top of the well screen at 30.5 ft bgs and top of bedrock at 8.0 ft bgs.	Completed
	Redesignate Other Areas monitoring well MW119 from bedrock to combination	Top of the well screen at 3.3 ft bgs and top of bedrock at 6.0 ft bgs.	Completed
	Redesignate Site M11 monitoring well MW108 from bedrock to combination	Top of the well screen at 7.0 ft bgs and top of bedrock at 9.0 ft bgs.	Completed
	Redesignate Site M11 monitoring well MW804 from combination to bedrock	Top of the well screen at 5.0 ft bgs and top of bedrock at 3.5 ft bgs.	Completed
	Site M11 groundwater flow maps have been revised from a water table and potentiometric to a shallow and deep potentiometric map.	Insufficient overburden wells to create a water table map.	Completed
	Redesignate Site M13 monitoring well MW362 from bedrock to combination	Top of the well screen at 28.0 ft bgs and top of bedrock at 29.5 ft bgs.	Completed
2014 Semi-annual			
	Mow Landfill L3 in December 2014 in opposite direction	Consistent cut height	Completed
	Spot treat woody vegetation on Landfill L3 cap in spring 2015	Kill woody vegetation	Pending
	Continue quarterly inspections at Landfill M11 through 2014	October 2013 and January 2014 inspections not completed	Completed
	Mow Landfill M11 in December 2014 in opposite direction	Consistent cut height	Completed
	Remove small trees from Landfill M11 rip rap apron	Kill woody vegetation	Completed
	Spot treat woody vegetation on Landfill M11 cap in spring 2015	Kill woody vegetation	Pending
	Clear debris from drainage ditch on south side of Landfill M13	Allow proper drainage	Pending
	Mow Landfill M13 in December 2014 in opposite direction	Consistent cut height	Completed
	Spot treat woody vegetation on Landfill M13 cap in spring 2015	Kill woody vegetation	Pending
	Remove small trees from Landfill M13 rip rap apron	Kill woody vegetation	Completed
	Complete additional mowing around Landfill M13 perimeter	Reduce encroachment	Pending
2014 Annual			
	Reduce inspections at Landfill M11 from quarterly to annual.	Sections 4.2.2.2 and 4.2.2.3.3 of LTM Plan	Pending
	Reduce groundwater sampling at Landfill M13 from quarterly to semi-annually	Section 4.2.3.5 of LTM Plan	Pending
	Remove early warning monitoring well MW124R from LTM	No RG exceedances since 2009 with no upgradient source areas	Pending

Notes:
Does not include minor maintenance activities such as replacing well locks.
Does not include recommendations repeated in subsequent reports.

FIGURES

Drawn By & Date: TLP 01/20/15
Approved By & Date: RJR 01/20/15
Revised By & Date:
Approved By & Date:



NOTE

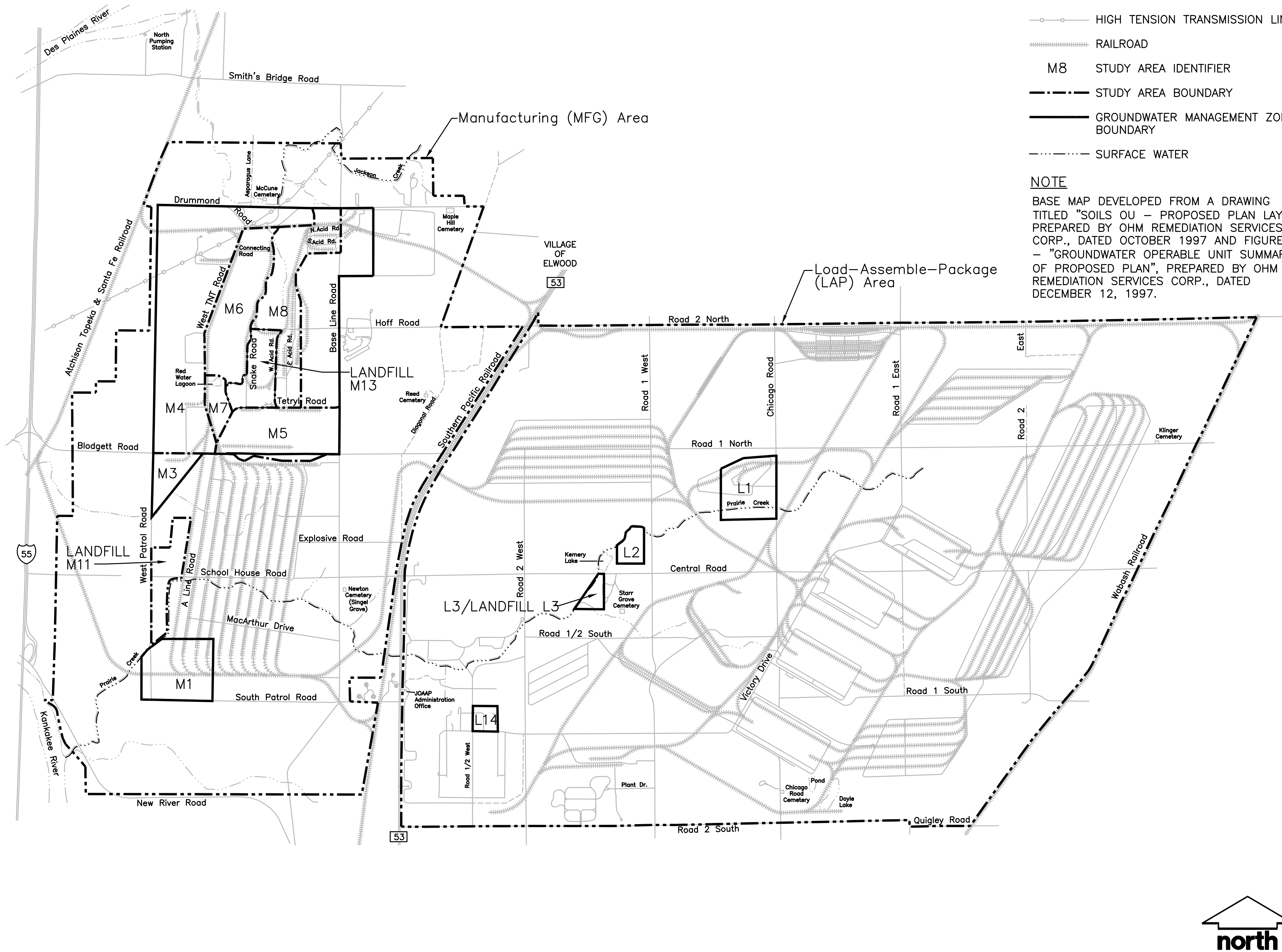
BASE MAP DEVELOPED FROM 2002 MICROSOFT CORPORATION, EXPEDIA.COM.

north

RJR DEVELOPED BY / TLP DRAWN BY / APPROVED 1/20/15 DATE / REVISIONS DATE	CONTRACT NO. W9124J-14-P-0142		SITE LOCATION MAP	FIGURE 1-1
	VERIFY SCALE 0 1/2 1 BAR REPRESENTS ONE INCH	SCALE 1"=4 Miles (Approx.)	2014 ANNUAL GROUNDWATER MONITORING REPORT JOLIET ARMY AMMUNITION PLANT WILL COUNTY, ILLINOIS	MWH

File: J:\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Figures\CADD\Figure 1-1.dwg Jan 20, 2015 – 3:53pm

Drawn By & Date: TLP 01/20/15 | Approved By & Date: RJR 01/20/15 | Revised By & Date: | Approved By & Date:



LEGEND

- APPROXIMATE JOAAP BOUNDARY
- HIGH TENSION TRANSMISSION LINE
- RAILROAD
- M8 STUDY AREA IDENTIFIER
- STUDY AREA BOUNDARY
- GROUNDWATER MANAGEMENT ZONE BOUNDARY
- SURFACE WATER

NOTE

BASE MAP DEVELOPED FROM A DRAWING TITLED "SOILS OU – PROPOSED PLAN LAYOUT", PREPARED BY OHM REMEDIATION SERVICES CORP., DATED OCTOBER 1997 AND FIGURE 2 – "GROUNDWATER OPERABLE UNIT SUMMARY OF PROPOSED PLAN", PREPARED BY OHM REMEDIATION SERVICES CORP., DATED DECEMBER 12, 1997.

TLP DRAWN BY | 01/20/15 DATE | RJR DEVELOPED BY | APPROVED BY | CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE 0 1/2 1 BAR REPRESENTS ONE INCH ON ORIGINAL | SCALE 1" = 4000'

REV | DATE | BY | DESCRIPTION

GROUNDWATER STUDY AREAS AND LANDFILL SITES

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

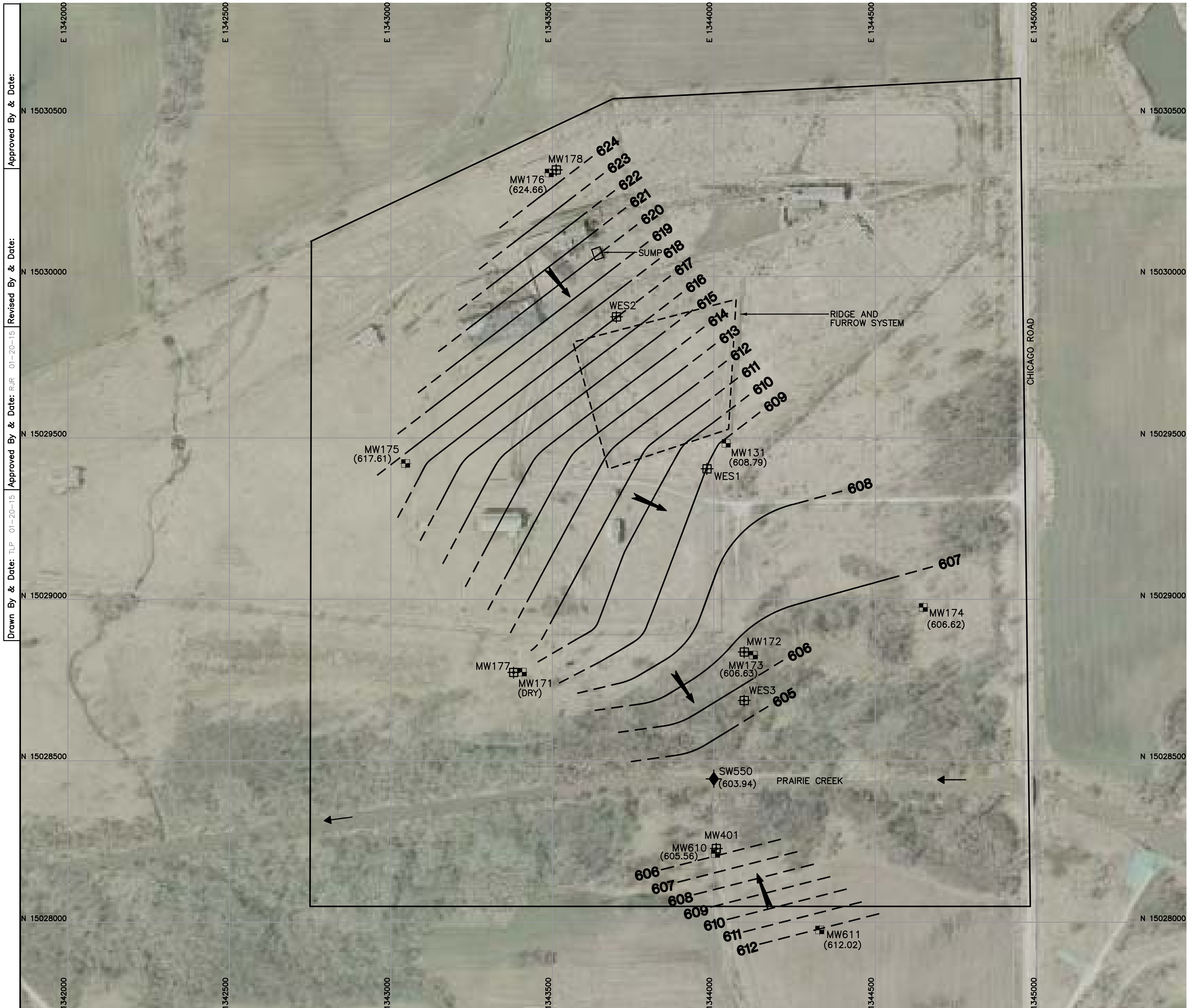
PRINTED 01/20/2015

FIGURE 1–2

DRAWING NUMBER 10506045 130101

USAEC

MWH



Drawn By & Date: TLP 01-20-15
Approved By & Date: RJR 01-20-15
Revised By & Date:
Approved By & Date:

LEGEND

MW175 (617.61)	OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
MW178	DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
SW550 (603.94)	SURFACE WATER MONITORING LOCATION, NUMBER, AND WATER ELEVATION
605	WATER TABLE CONTOUR (CONTOUR INTERVAL: 1 FT, DASHED WHERE INFERRED)
	DIRECTION OF WATER TABLE FLOW
	DIRECTION OF FLOW IN PRAIRIE CREEK
	GROUNDWATER MANAGEMENT ZONE BOUNDARY

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 9, 2014.
4. MONITORING WELLS USED TO CREATE THE WATER TABLE MAP ARE SHOWN WITH ELEVATIONS.

north

TLP DRAWN BY
01/21/15 DATE
RJR DEVELOPED BY
APPROVED BY
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 300'

REV	DATE	BY	DESCRIPTION

SITE FEATURES/WATER TABLE MAP – LAP AREA, SITE L1 (4TH QUARTER – DECEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

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01/21/2015

FIGURE 3-1

DRAWING NUMBER
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LEGEND

- MW176 — OVERBURDEN MONITORING WELL LOCATION AND NUMBER
- MW171 — SHALLOW BEDROCK MONITORING WELL LOCATION AND NUMBER
- MW178 (618.22) — DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
- SW550 (603.94) — SURFACE WATER MONITORING LOCATION, NUMBER AND WATER ELEVATION (NOT USED IN POTENTIOMETRIC SURFACE CONTOURING)
- **606** — POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL: 1 FT, DASHED WHERE INFERRED)
- DIRECTION OF BEDROCK FLOW
- DIRECTION OF FLOW IN PRAIRIE CREEK
- GROUNDWATER MANAGEMENT ZONE BOUNDARY

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 9, 2015.
4. MONITORING WELLS USED TO CREATE THE POTENTIOMETRIC SURFACE MAP ARE SHOWN WITH ELEVATIONS.

north

RJR — DEVELOPED BY | TLP — DRAWN BY

APPROVED BY | 01/21/15 — DATE

CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE — 0 1/2 1 — BAR REPRESENTS ONE INCH ON ORIGINAL

SCALE 1" = 300'

REV	DATE	BY	DESCRIPTION

POTENTIOMETRIC SURFACE MAP – LAP AREA, SITE L1 (4TH QUARTER – DECEMBER 2014)

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

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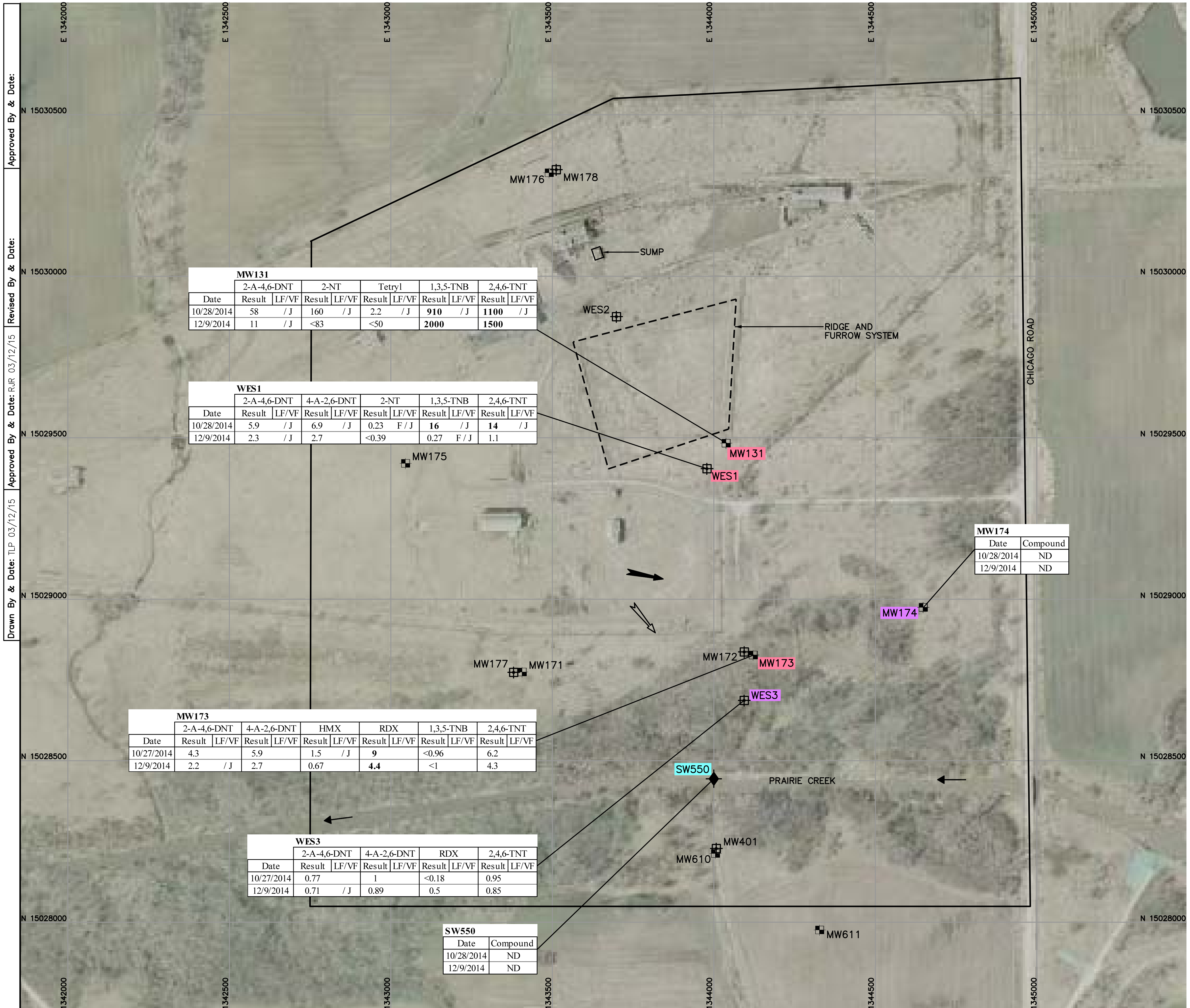
FIGURE 3-2

DRAWING NUMBER 10506045 130101

MWH



MW131

Date	2-A-4,6-DNT Result	2-A-4,6-DNT LF/VF	2-NT Result	2-NT LF/VF	Tetryl Result	Tetryl LF/VF	1,3,5-TNB Result	1,3,5-TNB LF/VF	2,4,6-TNT Result	2,4,6-TNT LF/VF
10/28/2014	58	/ J	160	/ J	2.2	/ J	**910**	/ J	**1100**	/ J
12/9/2014	11	/ J	<83		<50		**2000**		**1500**	

WES1

Date	2-A-4,6-DNT Result	2-A-4,6-DNT LF/VF	4-A-2,6-DNT Result	4-A-2,6-DNT LF/VF	2-NT Result	2-NT LF/VF	1,3,5-TNB Result	1,3,5-TNB LF/VF	2,4,6-TNT Result	2,4,6-TNT LF/VF
10/28/2014	5.9	/ J	6.9	/ J	0.23	F / J	**16**	/ J	**14**	/ J
12/9/2014	2.3	/ J	2.7		<0.39		0.27	F / J	1.1	

MW174

Date	Compound
10/28/2014	ND
12/9/2014	ND

MW173

Date	2-A-4,6-DNT Result	2-A-4,6-DNT LF/VF	4-A-2,6-DNT Result	4-A-2,6-DNT LF/VF	HMX Result	HMX LF/VF	RDX Result	RDX LF/VF	1,3,5-TNB Result	1,3,5-TNB LF/VF	2,4,6-TNT Result	2,4,6-TNT LF/VF
10/27/2014	4.3		5.9		1.5	/ J	**9**		<0.96		6.2	
12/9/2014	2.2	/ J	2.7		0.67		**4.4**		<1		4.3	

WES3

Date	2-A-4,6-DNT Result	2-A-4,6-DNT LF/VF	4-A-2,6-DNT Result	4-A-2,6-DNT LF/VF	RDX Result	RDX LF/VF	2,4,6-TNT Result	2,4,6-TNT LF/VF
10/27/2014	0.77		1		<0.18		0.95	
12/9/2014	0.71	/ J	0.89		0.5		0.85	

SW550

Date	Compound
10/28/2014	ND
12/9/2014	ND

LEGEND

- MW173 — OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- MW172 — DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- SW550 — SURFACE WATER MONITORING LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- IN-PLUME MONITORING POINT
- EARLY WARNING MONITORING POINT
- COMPLIANCE MONITORING POINT
- DIRECTION OF WATER TABLE FLOW
- DIRECTION OF BEDROCK FLOW
- DIRECTION OF FLOW IN PRAIRIE CREEK
- GROUNDWATER MANAGEMENT ZONE BOUNDARY
- < — RESULT SHOWS LAB LIMIT FOR NON-DETECTED RESULTS
- 1,3,5-TNB — 1,3,5-TRINITROBENZENE
- 2,4,6-TNT — 2,4,6-TRINITROTOLUENE
- 2-A-4,6-DNT — 2-AMINO-4,6-DINITROTOLUENE
- 2-NT — 2-NITROTOLUENE
- 4-A-2,6-DNT — 4-AMINO-2,6-DINITROTOLUENE
- HMX — HIGH MELTING EXPLOSIVE
- RDX — ROYAL DEMOLITION EXPLOSIVE
- F/ — CONCENTRATION BELOW THE REPORTED DETECTION LIMIT
- /J — ESTIMATED CONCENTRATION
- LF/VF — LAB FLAG/VALIDATION FLAG
- ND — NOT DETECTED
- NS — NO STANDARD
- RG — REMEDIATION GOAL

Compound	Project Action Limit[(1)]	Surface Water RG
1,3,5-TNB	5.1	15
2,4,6-TNT	9.5	75
2-A-4,6-DNT	NS	NS
2-NT	5,100	62
4-A-2,6-DNT	NS	NS
HMX	5,100	260
RDX	2.6	500
Tetryl	200	700

NOTES

1. REMEDIATION GOAL (PROJECT ACTION LIMITS) OBTAINED FROM WORKSHEET #15 OF APPENDIX B (QAPP) OF THE FINAL LONG TERM MONITORING PLAN (TOLTEST, 2010). IEPA CLASS II GROUNDWATER STANDARDS FOR INDUSTRIAL USES ARE PRESENTED WHERE CLASS I AND CLASS II STANDARDS (POTABLE AND INDUSTRIAL USES, RESPECTIVELY) WERE BOTH AVAILABLE.
2. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
3. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
4. SAMPLES COLLECTED BY MWH PERSONNEL IN OCTOBER AND DECEMBER 2014.
5. CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER (µg/L).
6. BOLDED VALUE INDICATES RG EXCEEDANCE.

north

Drawn By & Date: TLP 03/12/15 | Approved By & Date: RJR 03/12/15 | Revised By & Date: | Approved By & Date:

DRAWN BY: TLP | DATE: 03/12/2015 | DEVELOPED BY: RJR | APPROVED BY

CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE — 0 1/2 1 — BAR REPRESENTS ONE INCH ON ORIGINAL — SCALE 1" = 300'

REV | DATE | BY | DESCRIPTION

EXPLOSIVES DETECTIONS – LAP AREA, SITE L1 (2ND AND 4TH QUARTERS – OCTOBER AND DECEMBER 2014)

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 03/12/2015

FIGURE 3-3

DRAWING NUMBER 10506045 130101

MWH

LEGEND

- MW135 (631.42) — OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
- MW133 (601.59) — COMBINED MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
- MW621 — DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
- SW555 (600.45) — SURFACE WATER ELEVATION
- 600 — WATER TABLE CONTOUR (CONTOUR INTERVAL: 2 FT, DASHED WHERE INFERRED)
- DIRECTION OF WATER TABLE FLOW
- DIRECTION OF FLOW IN PRAIRIE CREEK
- GROUNDWATER MANAGEMENT ZONE BOUNDARY

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 8–10, 2014.
4. MONITORING WELLS USED TO CREATE THE WATER TABLE MAP ARE SHOWN WITH ELEVATIONS.

north

Drawn By & Date: TLP 01/21/15 | Approved By & Date: RJR 01/21/15 | Revised By & Date: | Approved By & Date:

DEVELOPED BY	RJR
DRAWN BY	TLP
APPROVED BY	
DATE	01/21/15
CONTRACT NO.	W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 300'

REV	DATE	BY	DESCRIPTION

SITE FEATURES/WATER TABLE MAP – LAP AREA, SITE L2 (4TH QUARTER – DECEMBER 2014)

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

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01/21/2015

FIGURE 3-4

DRAWING NUMBER
10506045
130101

USAEC

MWH

north

LEGEND

MW135	OVERBURDEN MONITORING WELL LOCATION AND NUMBER
MW406 (606.56)	COMBINED MONITORING WELL LOCATION, NUMBER AND POTENTIOMETRIC SURFACE ELEVATION
MW621 (601.45)	DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
SW555 (600.45)	SURFACE WATER ELEVATION (NOT USED IN POTENTIOMETRIC SURFACE CONTOURING)
602	POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL: 1 FT, DASHED WHERE INFERRED)
	DIRECTION OF BEDROCK FLOW
	DIRECTION OF FLOW IN PRAIRIE CREEK
	GROUNDWATER MANAGEMENT ZONE BOUNDARY

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 10, 2014.
4. MONITORING WELLS USED TO CREATE THE POTENTIOMETRIC SURFACE MAP ARE SHOWN WITH ELEVATIONS.
5. MW406 IS A COMBINATION OVERBURDEN/BEDROCK WELL USED AS A HORIZONTAL CONTROL POINT.

Drawn By & Date: TLP 01/21/15
Approved By & Date: RJR 01/21/15
Revised By & Date:
Approved By & Date:

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DEVELOPED BY
TLP
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APPROVED BY
01/21/15
DATE
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 300'

REV | DATE | BY | DESCRIPTION

POTENTIOMETRIC SURFACE MAP – LAP AREA, SITE L2 (4TH QUARTER – DECEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 01/21/2015

FIGURE 3-5

DRAWING NUMBER
10506045
130101

MWH

MW621

Date	Compound
12/10/2014	ND

SW555

Date	Compound
12/10/2014	ND

MW620

Date	Compound
12/10/2014	ND

MW404

	HMX		RDX	
Date	Result	LF/VF	Result	LF/VF
12/10/2014	27		**93**	

LEGEND

- MW810 — OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- MW404 — COMBINED MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- MW621 — DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- SW555 — SURFACE WATER MONITORING LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- IN-PLUME MONITORING POINT
- EARLY WARNING MONITORING POINT
- COMPLIANCE MONITORING POINT
- DIRECTION OF WATER TABLE FLOW
- DIRECTION OF BEDROCK FLOW
- DIRECTION OF FLOW IN PRAIRIE CREEK
- GROUNDWATER MANAGEMENT ZONE BOUNDARY
- ND — NON-DETECTED RESULT
- HMX — HIGH MELTING EXPLOSIVE
- RDX — ROYAL DEMOLITION EXPLOSIVE
- LF/VF — LAB FLAG/VALIDATION FLAG
- RG — REMEDIATION GOAL

Compound	Project Action Limit(1)	Surface Water RG
HMX	5,100	260
RDX	2.6	500

NOTES

1. REMEDIATION GOAL (PROJECT ACTION LIMITS) OBTAINED FROM WORKSHEET #15 OF APPENDIX B (QAPP) OF THE FINAL LONG TERM MONITORING PLAN (TOLTEST, 2010). IEPA CLASS II GROUNDWATER STANDARDS FOR INDUSTRIAL USES ARE PRESENTED WHERE CLASS I AND CLASS II STANDARDS (POTABLE AND INDUSTRIAL USES, RESPECTIVELY) WERE BOTH AVAILABLE.
2. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
3. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
4. SAMPLES COLLECTED BY MWH PERSONNEL IN DECEMBER 2014.
5. CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER (µg/L).
6. BOLDED VALUE INDICATES RG EXCEEDANCE.

Drawn By & Date: TLP 03/12/15
Approved By & Date: RJR 03/12/15
Revised By & Date:
Approved By & Date:

TLP DRAWN BY
RJR DEVELOPED BY
APPROVED BY
03/12/15 DATE
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 300'

REV | DATE | BY | DESCRIPTION

EXPLOSIVES DETECTIONS – LAP AREA, SITE L2 (4TH QUARTER – DECEMBER 2014)

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 03/12/2015

FIGURE 3-6

DRAWING NUMBER
10506045
130101

MWH

Approved By & Date:
Revised By & Date:
Approved By & Date: RJR 01/21/15
Drawn By & Date: TLP 01/21/15

LEGEND

MW134 (606.35)	OVERBURDEN MONITORING WELL LOCATION, NUMBER AND WATER TABLE ELEVATION
MW136 (596.09)	COMBINED MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
MW630	SHALLOW BEDROCK MONITORING WELL LOCATION AND NUMBER
MW412	DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
SW004 (590.40)	SURFACE WATER MONITORING LOCATION, NUMBER, AND WATER ELEVATION
600	WATER TABLE CONTOUR (CONTOUR INTERVAL: 1 FT, DASHED WHERE INFERRED)
	DIRECTION OF WATER TABLE FLOW
	DIRECTION OF FLOW IN PRAIRIE CREEK
	GROUNDWATER MANAGEMENT ZONE BOUNDARY
	APPROXIMATE LIMITS OF LANDFILL

NOTES

1. BASE MAP DEVELOPED FROM A PLAT OF TOPOGRAPHY PREPARED BY GEOTECH INC., CREST HILL, ILLINOIS, DATED MARCH 9, 2007, AND AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 10, 2014.
4. MONITORING WELLS USED TO CREATE THE WATER TABLE MAP ARE SHOWN WTH ELEVATIONS.
5. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM SITE L3 CLOSURE REPORT, PREPARED BY MWH, DATED JUNE 25, 2010.
6. MW136 IS A COMBINATION OVERBURDEN/BEDROCK WELL USED AS A HORIZONTAL CONTROL POINT.

RJR
DEVELOPED BY
TLP
DRAWN BY
APPROVED BY
01/21/15
DATE
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 200'

REV	DATE	BY	DESCRIPTION

SITE FEATURES/WATER TABLE MAP – LAP AREA, SITE L3/LANDFILL L3 (4TH QUARTER – DECEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED
01/21/2015

FIGURE 3-7

DRAWING NUMBER
10506045
130101

MWH

LEGEND

MW134	OVERBURDEN MONITORING WELL LOCATION AND NUMBER
MW136 (596.09)	COMBINED MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
MW630 (588.36)	SHALLOW BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
MW412 (594.01)	DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
SW777 (588.33)	SURFACE WATER MONITORING LOCATION, NUMBER AND ELEVATION (NOT USED IN POTENTIOMETRIC SURFACE CONTOURING)
590	POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL: 1 FT, DASHED WHERE INFERRED)
	DIRECTION OF BEDROCK FLOW
	DIRECTION OF FLOW IN PRAIRIE CREEK
	GROUNDWATER MANAGEMENT ZONE BOUNDARY
	APPROXIMATE LIMITS OF LANDFILL

NOTES

1. BASE MAP DEVELOPED FROM A PLAT OF TOPOGRAPHY PREPARED BY GEOTECH INC., CREST HILL, ILLINOIS, DATED MARCH 9, 2007, AND AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 10, 2014.
4. MONITORING WELLS USED TO CREATE THE POTENTIOMETRIC SURFACE MAP ARE SHOWN WITH ELEVATIONS.
5. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM SITE L3 CLOSURE REPORT, PREPARED BY MWH, DATED JUNE 25, 2010.
6. MW411 AND MW136 ARE COMBINATION OVERBURDEN/BEDROCK WELLS USED FOR HORIZONTAL CONTROL POINTS.

north

Drawn By & Date: TLP 01/21/15
Approved By & Date: RJR 01/21/15
Revised By & Date:
Approved By & Date:

RJR
DEVELOPED BY
TLP
DRAWN BY
APPROVED BY
01/21/15
DATE
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 200'

REV	DATE	BY	DESCRIPTION

POTENTIOMETRIC SURFACE MAP – LAP AREA, SITE L3/LANDFILL L3 (4TH QUARTER – DECEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED
01/21/2015

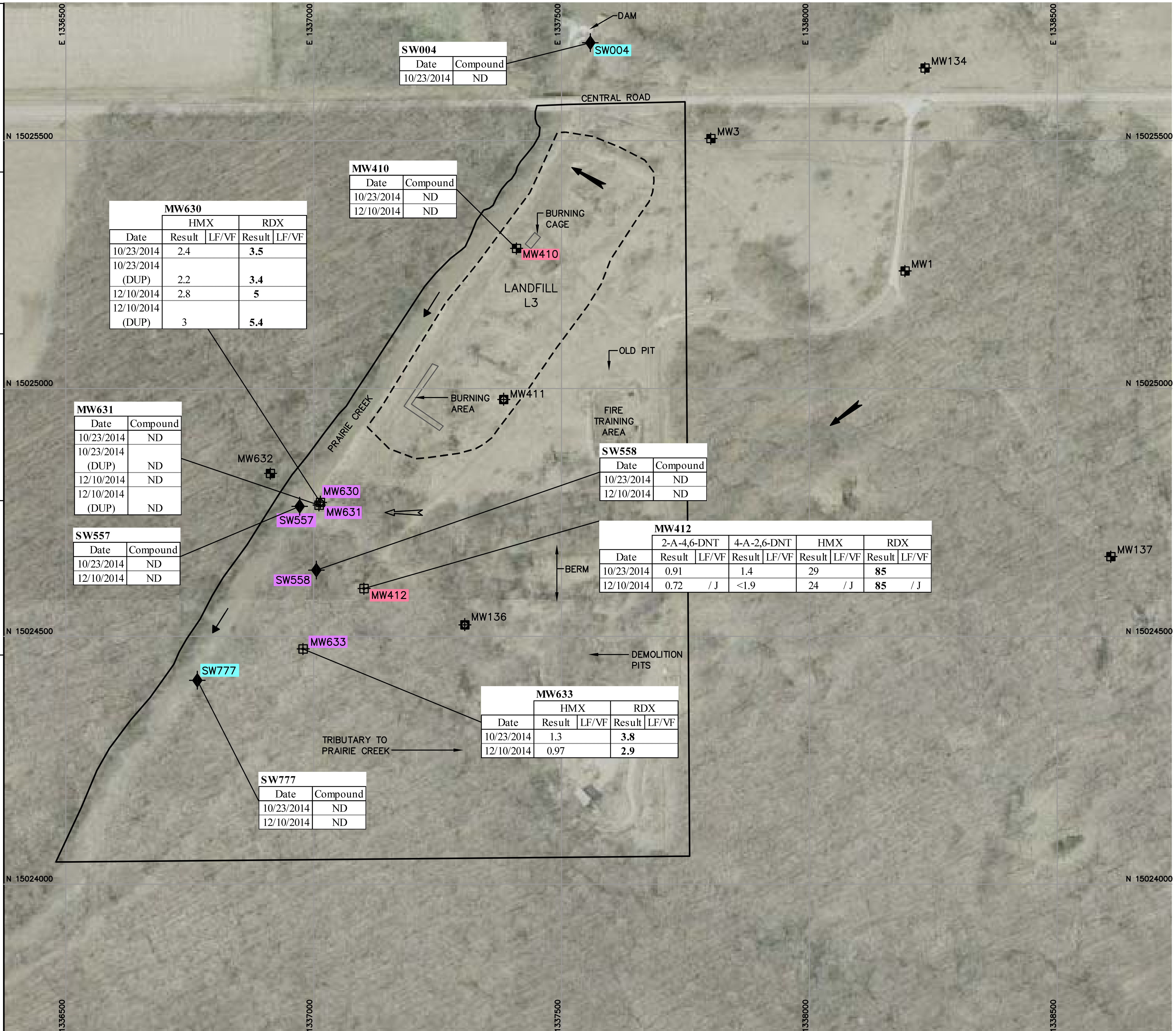
FIGURE 3-8

DRAWING NUMBER
10506045
130101

USAEC

MWH

Drawn By & Date: TLP 03/12/15
Approved By & Date: RJR 03/12/15
Revised By & Date:
Approved By & Date:



SW004

Date	Compound
10/23/2014	ND

MW410

Date	Compound
10/23/2014	ND
12/10/2014	ND

MW630

	HMX		RDX	
Date	Result	LF/VF	Result	LF/VF
10/23/2014	2.4		**3.5**	
10/23/2014 (DUP)	2.2		**3.4**	
12/10/2014	2.8		**5**	
12/10/2014 (DUP)	3		**5.4**	

MW631

Date	Compound
10/23/2014	ND
10/23/2014 (DUP)	ND
12/10/2014	ND
12/10/2014 (DUP)	ND

SW557

Date	Compound
10/23/2014	ND
12/10/2014	ND

SW558

Date	Compound
10/23/2014	ND
12/10/2014	ND

MW412

	2-A-4,6-DNT		4-A-2,6-DNT		HMX		RDX	
Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
10/23/2014	0.91		1.4		29		**85**	
12/10/2014	0.72	/J	<1.9		24	/J	**85**	/J

MW633

	HMX		RDX	
Date	Result	LF/VF	Result	LF/VF
10/23/2014	1.3		**3.8**	
12/10/2014	0.97		**2.9**	

SW777

Date	Compound
10/23/2014	ND
12/10/2014	ND

LEGEND

MW410	OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
MW411	COMBINED MONITORING WELL LOCATION AND NUMBER
MW630	SHALLOW BEDROCK MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
MW412	DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
SW777	SURFACE WATER MONITORING LOCATION, NUMBER, AND EXPLSOIVES DETECTIONS
	IN-PLUME/DOWNGRADIENT MONITORING POINT
	EARLY WARNING/DOWNGRADIENT MONITORING POINT
	COMPLIANCE/DOWNGRADIENT AND UPGRADIENT MONITORING POINT
	DIRECTION OF WATER TABLE FLOW
	DIRECTION OF BEDROCK FLOW
	DIRECTION OF FLOW IN PRAIRIE CREEK
	GROUNDWATER MANAGEMENT ZONE BOUNDARY
	APPROXIMATE LIMITS OF LANDFILL
<	RESULT SHOWS LAB LIMIT FOR NON-DETECTED RESULTS
2-A-4,6-DNT	2-AMINO-4,6-DINITROTOLUENE
4-A-2,6-DNT	4-AMINO-2,6-DINITROTOLUENE
HMX	HIGH MELTING EXPLOSIVE
RDX	ROYAL DEMOLITION EXPLOSIVE
DUP	DUPLICATE
LF/VF	LAB FLAG/VALIDATION FLAG
/J	ESTIMATED CONCENTRATION
ND	NOT DETECTED
NS	NO STANDARD
RG	REMEDIATION GOAL

Compound	Project Action Limit[(1)]	Surface Water RG
HMX	5,100	260
2-A-4,6-DNT	NS	NS
4-A-2,6-DNT	NS	NS
RDX	2.6	500

NOTES

1. REMEDIATION GOAL (PROJECT ACTION LIMITS) OBTAINED FROM WORKSHEET #15 OF APPENDIX B (QAPP) OF THE FINAL LONG TERM MONITORING PLAN (TOLTEST, 2010). IEPA CLASS II GROUNDWATER STANDARDS FOR INDUSTRIAL USES ARE PRESENTED WHERE CLASS I AND CLASS II STANDARDS (POTABLE AND INDUSTRIAL USES, RESPECTIVELY) WERE BOTH AVAILABLE.
2. BASE MAP DEVELOPED FROM A PLAT OF TOPOGRAPHY PREPARED BY GEOTECH INC., CREST HILL, ILLINOIS, DATED MARCH 9, 2007, AND AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
3. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
4. SAMPLES COLLECTED BY MWH PERSONNEL IN OCTOBER AND DECEMBER 2014.
5. CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER (μg/L).
6. BOLDED VALUE INDICATES RG EXCEEDANCE.
7. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM SITE L3 CLOSURE REPORT, PREPARED BY MWH, DATED JUNE 25, 2010.

north

TLP DRAWN BY 03/12/15 DATE
RJR DEVELOPED BY
APPROVED BY
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 200'

REV	DATE	BY	DESCRIPTION

EXPLOSIVES DETECTIONS – LAP AREA, SITE L3/LANDFILL L3 (2ND AND 4TH QUARTERS – OCTOBER AND DECEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 03/12/2015

FIGURE 3-9

DRAWING NUMBER 10506045 130101

MWH

Drawn By & Date: TLP 01/26/15 | Approved By & Date: RJR 01/26/15 | Revised By & Date: | Approved By & Date:

LEGEND

MW512 (578.47)	OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
MW603 (572.20)	COMBINED MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
MW602	DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
575	WATER TABLE CONTOUR (CONTOUR INTERVAL: 1 FT, DASHED WHERE INFERRED)
	DIRECTION OF WATER TABLE FLOW
	GROUNDWATER MANAGEMENT ZONE BOUNDARY

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 9, 2014.
4. MONITORING WELLS USED TO CREATE THE WATER TABLE MAP ARE SHOWN WITH ELEVATIONS.

north

RJR DEVELOPED BY | TLP DRAWN BY
APPROVED BY | 01/26/15 DATE
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 200'

REV	DATE	BY	DESCRIPTION

SITE FEATURES/WATER TABLE MAP – LAP AREA, SITE L14 (4TH QUARTER – DECEMBER 2014)

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 01/26/2015

FIGURE 3-10

DRAWING NUMBER
10506045
130101

MWH

Drawn By & Date: TLP 01/26/15
Approved By & Date: RJR 01/26/15
Revised By & Date:
Approved By & Date:

LEGEND

MW512	OVERBURDEN MONITORING WELL LOCATION AND NUMBER
MW140 (574.82)	COMBINED MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
MW602 (573.88)	DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
573	POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL: 1 FT, DASHED WHERE INFERRED)
	DIRECTION OF BEDROCK FLOW
	GROUNDWATER MANAGEMENT ZONE BOUNDARY

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 9, 2014.
4. MONITORING WELLS USED TO CREATE THE POTENTIOMETRIC SURFACE MAP ARE SHOWN WITH ELEVATIONS.
5. MW140 IS A COMBINATION OVERBURDEN/BEDROCK WELL USED AS A HORIZONTAL CONTROL POINT.

north

RJR DEVELOPED BY
TLP DRAWN BY
APPROVED BY
01/26/15 DATE
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 200'

REV	DATE	BY	DESCRIPTION

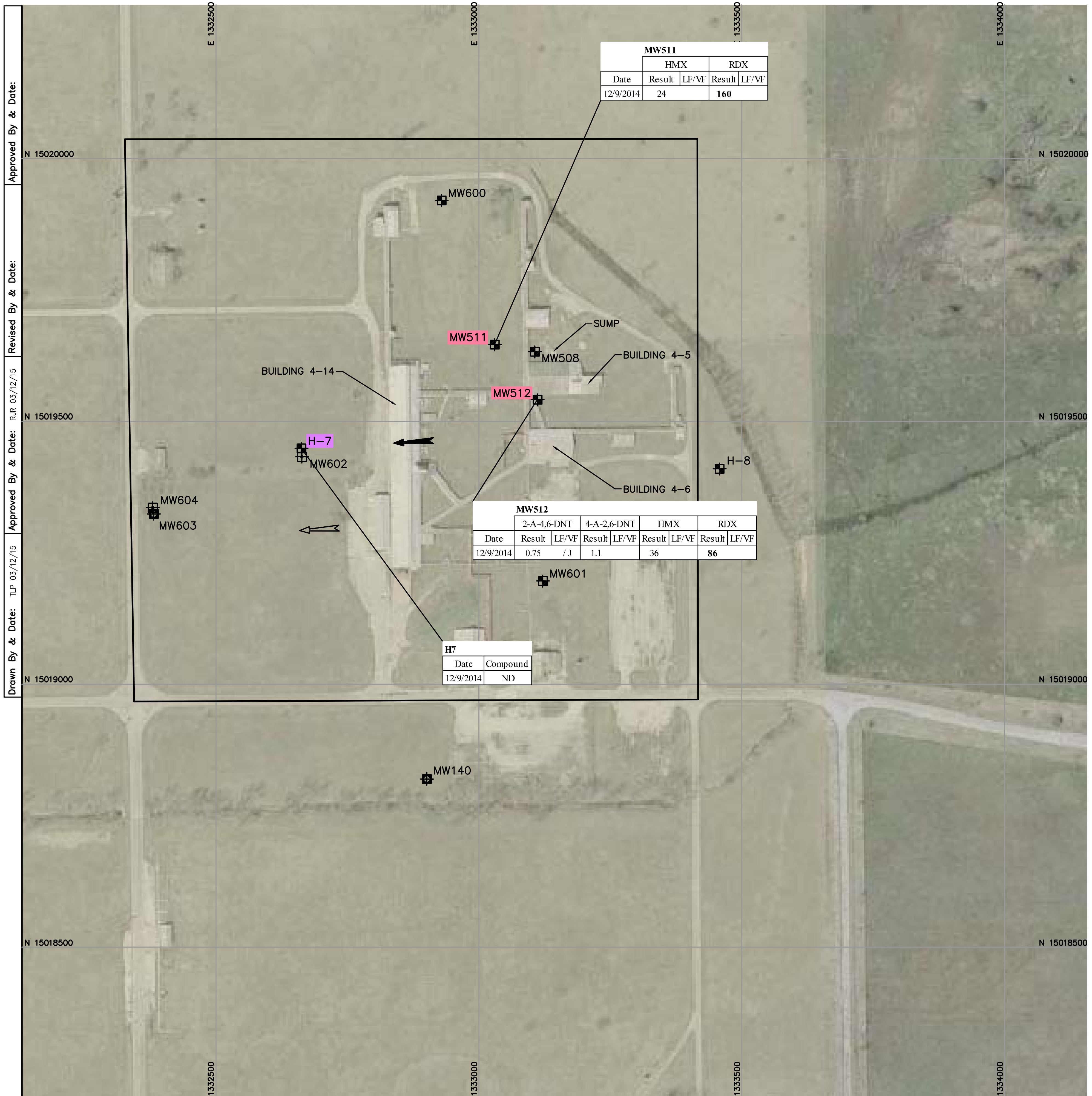
POTENTIOMETRIC SURFACE MAP – LAP AREA, SITE L14 (4TH QUARTER – DECEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED
01/26/2015

FIGURE 3-11

DRAWING NUMBER
10506045
130101

MWH



MW511

	HMX		RDX	
Date	Result	LF/VF	Result	LF/VF
12/9/2014	24		**160**	

MW512

	2-A-4,6-DNT		4-A-2,6-DNT		HMX		RDX	
Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
12/9/2014	0.75	/J	1.1		36		**86**	

H7

Date	Compound
12/9/2014	ND

LEGEND

- MW512 — OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- MW140 — COMBINED MONITORING WELL LOCATION AND NUMBER
- MW604 — DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- IN-PLUME MONITORING POINT
- EARLY WARNING MONITORING POINT
- COMPLIANCE MONITORING POINT
- DIRECTION OF WATER TABLE FLOW
- DIRECTION OF BEDROCK FLOW
- GROUNDWATER MANAGEMENT ZONE BOUNDARY
- < — RESULT SHOWS LAB LIMIT FOR NON-DETECTED RESULTS
- 2-A-4,6-DNT — 2-AMINO-4,6-DINITROTOLUENE
- 4-A-2,6-DNT — 4-AMINO-2,6-DINITROTOLUENE
- HMX — HIGH MELTING EXPLOSIVE
- RDX — ROYAL DEMOLITION EXPLOSIVE
- /J — ESTIMATED CONCENTRATION
- LF/VF — LAB FLAG/VALIDATION FLAG
- ND — NOT DETECTED
- NS — NO STANDARD
- RG — REMEDIATION GOAL

Compound	Project Action Limit[1]	Surface Water RG
HMX	5,100	260
2-A-4,6-DNT	NS	NS
4-A-2,6-DNT	NS	NS
RDX	2.6	500

NOTES

1. REMEDIATION GOAL (PROJECT ACTION LIMITS) OBTAINED FROM WORKSHEET #15 OF APPENDIX B (QAPP) OF THE FINAL LONG TERM MONITORING PLAN (TOLTEST, 2010). IEPA CLASS II GROUNDWATER STANDARDS FOR INDUSTRIAL USES ARE PRESENTED WHERE CLASS I AND CLASS II STANDARDS (POTABLE AND INDUSTRIAL USES, RESPECTIVELY) WERE BOTH AVAILABLE.
2. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
3. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
4. SAMPLES COLLECTED BY MWH PERSONNEL IN DECEMBER 2014.
5. CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER ($\mu g/L$).
6. BOLDED VALUE INDICATES RG EXCEEDANCE.

north

TLP DRAWN BY 03/12/15 DATE
RJR DEVELOPED BY APPROVED BY
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE 0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 200'

REV	DATE	BY	DESCRIPTION

EXPLOSIVES DETECTIONS – LAP AREA, SITE L14 (4TH QUARTER – DECEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 03/12/2015

FIGURE 3-12

DRAWING NUMBER 10506045 130101

MWH

Drawn By & Date: TLP 01/26/15

Approved By & Date: RJR 01/26/15

Revised By & Date:

Approved By & Date:

LEGEND

MW104 (542.95) OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION

MW105 (549.33) COMBINED MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION

MW201 DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER

SW709 (533.01) SURFACE WATER LOCATION, NUMBER, AND WATER ELEVATION

540 WATER TABLE CONTOUR (CONTOUR INTERVAL: 1 FT, DASHED WHERE INFERRED)

DIRECTION OF WATER TABLE FLOW

DIRECTION OF FLOW IN PRAIRIE CREEK

GROUNDWATER MANAGEMENT ZONE BOUNDARY

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 8, 2014.
4. MONITORING WELLS USED TO CREATE THE WATER TABLE MAP ARE SHOWN WITH ELEVATIONS.
5. MW105 AND MW107 ARE COMBINATION OVERBURDEN/BEDROCK WELLS USED AS HORIZONTAL CONTROL POINTS.

north

DEVELOPED BY	RJR
DRAWN BY	TLP
APPROVED BY	
DATE	01/26/15
CONTRACT NO.	W9124J-14-P-0142

VERIFY SCALE

0 1/2 1

BAR REPRESENTS ONE INCH ON ORIGINAL

SCALE 1" = 300'

REV	DATE	BY	DESCRIPTION

SITE FEATURES/WATER TABLE MAP – MANUFACTURING AREA, SITE M1 (4TH QUARTER – DECEMBER 2014)

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 01/26/2015

FIGURE 3-13

DRAWING NUMBER
10506045
130101

MWH

LEGEND

- MW104 — OVERBURDEN MONITORING WELL LOCATION AND NUMBER
- MW105 — COMBINED MONITORING WELL LOCATION AND NUMBER
- MW640 (544.17) — DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
- SW709 — SURFACE WATER ELEVATION (NOT USED IN POTENTIOMETRIC SURFACE CONTOURING)
- 540 — POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL: 1 FT, DASHED WHERE INFERRED)
- DIRECTION OF BEDROCK FLOW
- DIRECTION OF FLOW IN PRAIRIE CREEK
- GROUNDWATER MANAGEMENT ZONE BOUNDARY

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 9, 2014.
4. MONITORING WELLS USED TO CREATE THE POTENTIOMETRIC SURFACE MAP ARE SHOWN WITH ELEVATIONS.

DEVELOPED BY	RJR
DRAWN BY	TLP
APPROVED BY	
DATE	01/28/15
CONTRACT NO.	W9124J-14-P-0142

VERIFY SCALE
BAR REPRESENTS ONE INCH ON ORIGINAL
0 1/2 1
SCALE 1" = 300'

REV	DATE	BY	DESCRIPTION

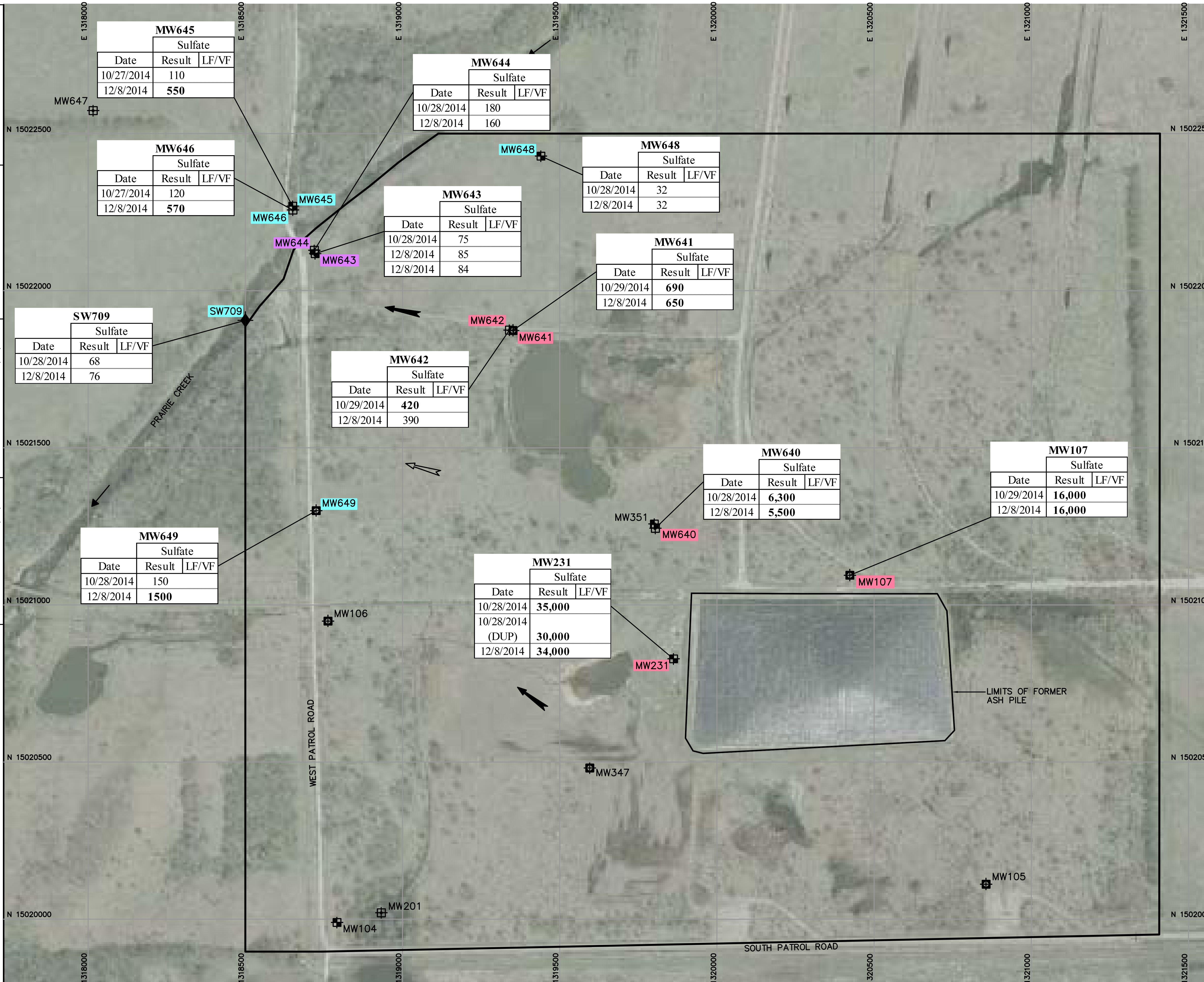
POTENTIOMETRIC SURFACE MAP – MANUFACTURING AREA, SITE M1 (4TH QUARTER – DECEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED
01/28/2015

FIGURE 3-14

DRAWING NUMBER
10506045
130101

MWH



MW645

Date	Sulfate Result	LF/VF
10/27/2014	110	
12/8/2014	**550**	

MW644

Date	Sulfate Result	LF/VF
10/28/2014	180	
12/8/2014	160	

MW646

Date	Sulfate Result	LF/VF
10/27/2014	120	
12/8/2014	**570**	

MW648

Date	Sulfate Result	LF/VF
10/28/2014	32	
12/8/2014	32	

MW643

Date	Sulfate Result	LF/VF
10/28/2014	75	
12/8/2014	85	
12/8/2014	84	

MW641

Date	Sulfate Result	LF/VF
10/29/2014	**690**	
12/8/2014	**650**	

SW709

Date	Sulfate Result	LF/VF
10/28/2014	68	
12/8/2014	76	

MW642

Date	Sulfate Result	LF/VF
10/29/2014	**420**	
12/8/2014	390	

MW640

Date	Sulfate Result	LF/VF
10/28/2014	**6,300**	
12/8/2014	**5,500**	

MW107

Date	Sulfate Result	LF/VF
10/29/2014	**16,000**	
12/8/2014	**16,000**	

MW649

Date	Sulfate Result	LF/VF
10/28/2014	150	
12/8/2014	**1500**	

MW231

Date	Sulfate Result	LF/VF
10/28/2014	**35,000**	
10/28/2014 (DUP)	**30,000**	
12/8/2014	**34,000**	

LEGEND

- MW648 OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND SULFATE DETECTIONS
- MW641 COMBINED MONITORING WELL LOCATION, NUMBER, AND SULFATE DETECTIONS
- MW642 DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND SULFATE DETECTIONS
- SW709 SURFACE WATER MONITORING LOCATION, NUMBER, AND SULFATE DETECTIONS
- IN–PLUME MONITORING POINT
- EARLY WARNING MONITORING POINT
- COMPLIANCE MONITORING POINT
- DIRECTION OF WATER TABLE FLOW
- DIRECTION OF BEDROCK FLOW
- DIRECTION OF FLOW IN PRAIRIE CREEK
- GROUNDWATER MANAGEMENT ZONE BOUNDARY
- DUP DUPLICATE
- LF/VF LAB FLAG/VALIDATION FLAG
- mg/L MILLIGRAMS PER LITER
- NS NO STANDARD
- RG REMEDIATION GOAL

	Sulfate
Units	mg/L
Project Action Limit[1]	400
Surface Water RG	NS

NOTES

1. REMEDIATION GOAL (PROJECT ACTION LIMITS) OBTAINED FROM WORKSHEET #15 OF APPENDIX B (QAPP) OF THE FINAL LONG TERM MONITORING PLAN (TOLTEST, 2010). IEPA CLASS II GROUNDWATER STANDARDS FOR INDUSTRIAL USES ARE PRESENTED WHERE CLASS I AND CLASS II STANDARDS (POTABLE AND INDUSTRIAL USES, RESPECTIVELY) WERE BOTH AVAILABLE.
2. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
3. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
4. SAMPLES COLLECTED BY MWH PERSONNEL IN OCTOBER AND DECEMBER 2014.
5. CONCENTRATIONS REPORTED IN MILLIGRAMS PER LITER (mg/L).
6. BOLDED VALUE INDICATES RG EXCEEDANCE.

Drawn By & Date: TLP 03/12/15
Approved By & Date:
Revised By & Date: RJR 03/12/15
Approved By & Date:

TLP DRAWN BY 03/12/15 DATE
RJR DEVELOPED BY APPROVED BY
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE 0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 300'

REV DATE BY DESCRIPTION

SULFATE DETECTIONS – MANUFACTURING AREA, SITE M1 (2ND AND 4TH QUARTERS – OCTOBER AND DECEMBER 2014)

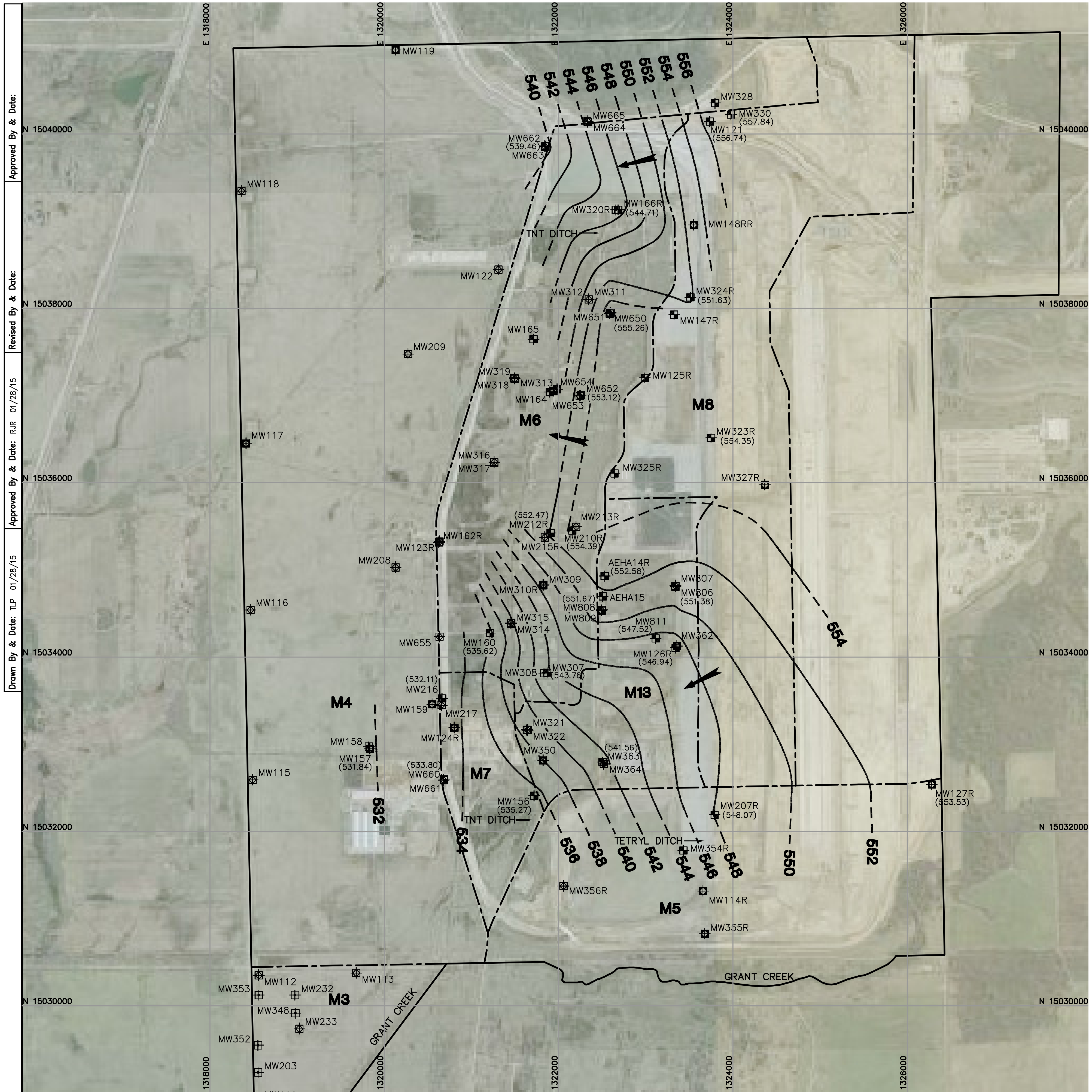
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 03/12/2015

FIGURE 3-15

DRAWING NUMBER 10506045 130101

MWH



LEGEND

- MW324R (551.63) — OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
- MW652 (553.12) — COMBINED MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
- MW356 — SHALLOW BEDROCK MONITORING WELL LOCATION AND NUMBER
- MW308 — DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
- 550 — WATER TABLE CONTOUR (CONTOUR INTERVAL: 2', DASHED WHERE INFERRED)
- DIRECTION OF WATER TABLE FLOW
- GROUNDWATER MANAGEMENT ZONE BOUNDARY
- STUDY AREA BOUNDARIES

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL IN DECEMBER, 2014.
4. MONITORING WELLS USED TO CREATE THE WATER TABLE MAP ARE SHOWN WITH ELEVATIONS.
5. MW117, MW127R, AND MW327R ARE COMBINATION OVERBURDEN/BEDROCK WELLS USED AS HORIZONTAL CONTROL POINTS.

Drawn By & Date:	TLP 01/28/15
Approved By & Date:	RJR 01/28/15
Revised By & Date:	
Approved By & Date:	

RJR DEVELOPED BY | TLP DRAWN BY | APPROVED BY | 01/28/15 DATE

CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE 0 1/2 1 BAR REPRESENTS ONE INCH ON ORIGINAL

SCALE 1" = 1200'

REV	DATE	BY	DESCRIPTION

SITE FEATURES/WATER TABLE MAP – MANUFACTURING AREA, MFG – SITES M4, M5, M6, M7, M8, M13, AND OTHER AREAS (4TH QUARTER – DECEMBER 2014)

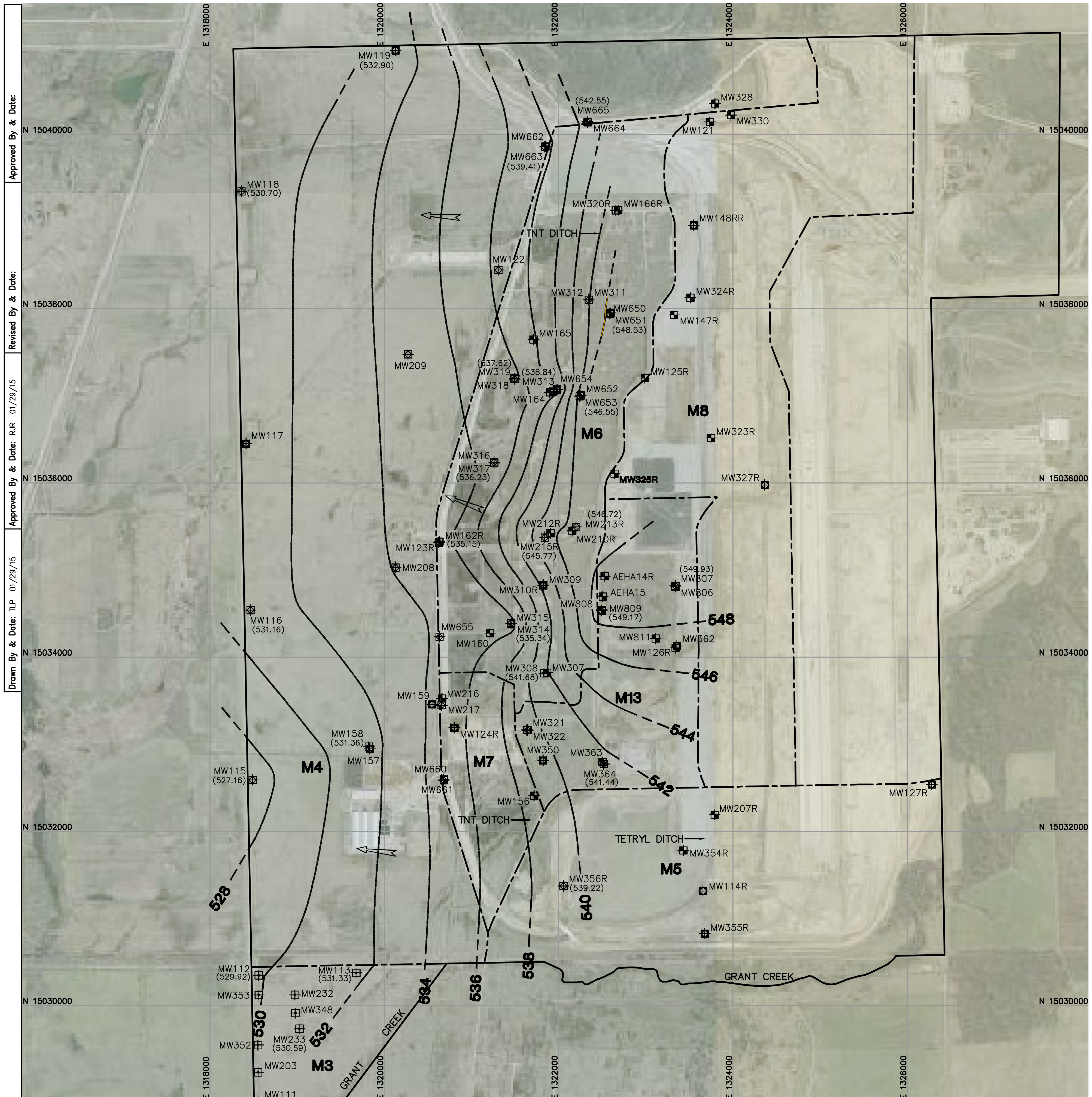
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 01/28/2015

FIGURE 3-16

DRAWING NUMBER 10506045 130101

MWH



Drawn By & Date: TLP 01/29/15

Approved By & Date: RJR 01/29/15

Revised By & Date:

Approved By & Date:

LEGEND

MW325R — OVERBURDEN MONITORING WELL LOCATION AND NUMBER

MW350 — COMBINED MONITORING WELL LOCATION AND NUMBER

MW356R (539.22) — SHALLOW BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION

MW308 (541.68) — DEEPER BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION

540 — POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL: 2 FT, DASHED WHERE INFERRED)

DIRECTION OF BEDROCK FLOW

GROUNDWATER MANAGEMENT ZONE BOUNDARY

STUDY AREA BOUNDARIES

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL IN DECEMBER 2014.
4. MONITORING WELLS USED TO CREATE THE POTENTIOMETRIC SURFACE MAP ARE SHOWN WITH ELEVATIONS.

north

DEVELOPED BY	DRAWN BY
RJR	TLP
APPROVED BY	DATE
	01/29/15

CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE

0 1/2 1

BAR REPRESENTS ONE INCH ON ORIGINAL

SCALE 1" = 1200'

REV	DATE	BY	DESCRIPTION

POTENTIOMETRIC SURFACE MAP – MANUFACTURING AREA, MFG – SITES M4, M5, M6, M7, M8, M13, AND OTHER AREAS (4TH QUARTER – DECEMBER 2014)

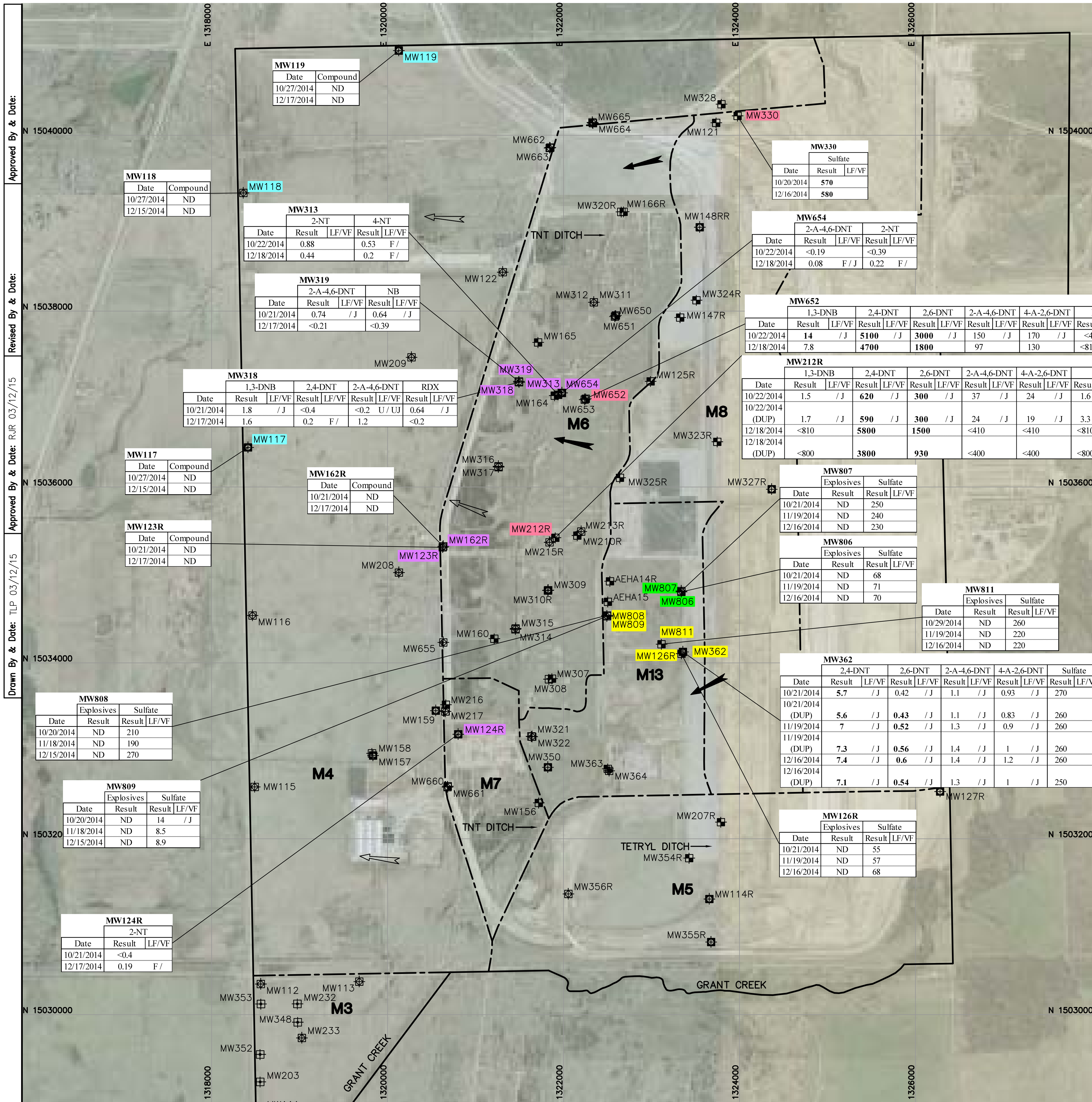
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 01/29/2015

FIGURE 3-17

DRAWING NUMBER
10506045
130101

MWH



MW119

Date	Compound
10/27/2014	ND
12/17/2014	ND

MW118

Date	Compound
10/27/2014	ND
12/15/2014	ND

MW313

	2-NT		4-NT	
Date	Result	LF/VF	Result	LF/VF
10/22/2014	0.88		0.53	F /
12/18/2014	0.44		0.2	F /

MW319

	2-A-4,6-DNT		NB	
Date	Result	LF/VF	Result	LF/VF
10/21/2014	0.74	/ J	0.64	/ J
12/17/2014	<0.21		<0.39	

MW318

	1,3-DNB		2,4-DNT		2-A-4,6-DNT		RDX	
Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
10/21/2014	1.8	/ J	<0.4		<0.2	U / UJ	0.64	/ J
12/17/2014	1.6		0.2	F /	1.2		<0.2	

MW117

Date	Compound
10/27/2014	ND
12/15/2014	ND

MW162R

Date	Compound
10/21/2014	ND
12/17/2014	ND

MW123R

Date	Compound
10/21/2014	ND
12/17/2014	ND

MW808

	Explosives	Sulfate	
Date	Result	Result	LF/VF
10/20/2014	ND	210	
11/18/2014	ND	190	
12/15/2014	ND	270	

MW809

	Explosives	Sulfate	
Date	Result	Result	LF/VF
10/20/2014	ND	14	/ J
11/18/2014	ND	8.5	
12/15/2014	ND	8.9	

MW124R

	2-NT	
Date	Result	LF/VF
10/21/2014	<0.4	
12/17/2014	0.19	F /

MW330

	Sulfate	
Date	Result	LF/VF
10/20/2014	**570**	
12/16/2014	**580**	

MW654

	2-A-4,6-DNT		2-NT	
Date	Result	LF/VF	Result	LF/VF
10/22/2014	<0.19		<0.39	
12/18/2014	0.08	F / J	0.22	F /

MW652

	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		2,4,6-TNT	
Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
10/22/2014	**14**	/ J	**5100**	/ J	**3000**	/ J	150	/ J	170	/ J	<4		27	/ J	**17000**	/ J	2700	/ J	16000	/ J	**1200**	/ J
12/18/2014	7.8		**4700**		**1800**		97		130		<810		17		**19000**		2100		15000		**610**	

MW212R

	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		NB		2-NT		3-NT		4-NT		1,3,5-TNB		2,4,6-TNT	
Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
10/22/2014	1.5	/ J	**620**	/ J	**300**	/ J	37	/ J	24	/ J	1.6	/ J	1800	/ J	490	/ J	1700	/ J	<0.98		**60**	/ J
10/22/2014 (DUP)	1.7	/ J	**590**	/ J	**300**	/ J	24	/ J	19	/ J	3.3	/ J	1700	/ J	390	/ J	1600	/ J	<1		**85**	/ J
12/18/2014	<810		**5800**		**1500**		<410		<410		<810		**22000**		1900		12000		8.4	F /	**940**	
12/18/2014 (DUP)	<800		**3800**		**930**		<400		<400		<800		**14000**		1400		8600		3.2	F /	**460**	

MW807

	Explosives	Sulfate	
Date	Result	Result	LF/VF
10/21/2014	ND	250	
11/19/2014	ND	240	
12/16/2014	ND	230	

MW806

	Explosives	Sulfate	
Date	Result	Result	LF/VF
10/21/2014	ND	68	
11/19/2014	ND	71	
12/16/2014	ND	70	

MW811

	Explosives	Sulfate	
Date	Result	Result	LF/VF
10/29/2014	ND	260	
11/19/2014	ND	220	
12/16/2014	ND	220	

MW362

	2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		Sulfate	
Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
10/21/2014	**5.7**	/ J	0.42	/ J	1.1	/ J	0.93	/ J	270	
10/21/2014 (DUP)	**5.6**	/ J	**0.43**	/ J	1.1	/ J	0.83	/ J	260	
11/19/2014	**7**	/ J	**0.52**	/ J	1.3	/ J	0.9	/ J	260	
11/19/2014 (DUP)	**7.3**	/ J	**0.56**	/ J	1.4	/ J	1	/ J	260	
12/16/2014	**7.4**	/ J	**0.6**	/ J	1.4	/ J	1.2	/ J	260	
12/16/2014 (DUP)	**7.1**	/ J	**0.54**	/ J	1.3	/ J	1	/ J	250	

MW126R

	Explosives	Sulfate	
Date	Result	Result	LF/VF
10/21/2014	ND	55	
11/19/2014	ND	57	
12/16/2014	ND	68	

Compound	Project Action Limit(1)	Surface Water RG
1,3-DNB	10	4
1,3,5-TNB	5.1	15
2,4,6-TNT	9.5	75
2,4-DNT	0.42	330
2,6-DNT	0.42	150
2-A-4,6-DNT	NS	NS
2-NT	5100	62
3-NT	NS	NS
4-A-2,6-DNT	NS	NS
4-NT	NS	NS
NB	51	8000
RDX	2.6	500
Sulfate	400	NS
HMX	5,100	260

LEGEND

- MW212R — OVERBURDEN MONITORING WELL LOCATION NUMBER, AND EXPLOSIVES DETECTIONS
- MW124R — COMBINED MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- MW115 — SHALLOW BEDROCK MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
- MW308 — DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
- IN-PLUME MONITORING POINT
- EARLY WARNING MONITORING POINT
- COMPLIANCE MONITORING POINT
- DOWNGRADIENT MONITORING POINT
- UPGRADIENT MONITORING POINT
- DIRECTION OF WATER TABLE FLOW
- DIRECTION OF BEDROCK FLOW
- GROUNDWATER MANAGEMENT ZONE BOUNDARY
- STUDY AREA BOUNDARIES

<	RESULT SHOWS LAB LIMIT FOR NON-DETECTED RESULTS
1,3-DNB	1,3-DINITROBENZENE
1,3,5-TNB	1,3,5-TRINITROBENZENE
2,4,6-TNT	2,4,6-TRINITROTOLUENE
2,4-DNT	2,4-DINITROTOLUENE
2,6-DNT	2,6-DINITROTOLUENE
2-A-4,6-DNT	2-AMINO-4,6-DINITROTOLUENE
2-NT	2-NITROTOLUENE
3-NT	3-NITROTOLUENE
4-A-2,6-DNT	4-AMINO-2,6-DINITROTOLUENE
4-NT	4-NITROTOLUENE
HMX	HIGH MELTING EXPLOSIVE
RDX	ROYAL DEMOLITION EXPLOSIVE
NB	NITROBENZENE
DUP	DUPLICATE
F/	CONCENTRATION BELOW THE REPORTED DETECTION LIMIT
/J	ESTIMATED CONCENTRATION
U/	NOT DETECTED
/UJ	NOT DETECTED, ESTIMATED DETECTION LIMIT
LF/VF	LAB FLAG/VALIDATION FLAG
ND	NOT DETECTED
NS	NO STANDARD
RG	REMEDIATION GOAL

NOTES

1. REMEDIATION GOAL (PROJECT ACTION LIMITS) OBTAINED FROM WORKSHEET #15 OF APPENDIX B (QAPP) OF THE FINAL LONG TERM MONITORING PLAN (TOLTEST, 2010). IEPA CLASS II GROUNDWATER STANDARDS FOR INDUSTRIAL USES ARE PRESENTED WHERE CLASS I AND CLASS II STANDARDS (POTABLE AND INDUSTRIAL USES, RESPECTIVELY) WERE BOTH AVAILABLE.
2. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
3. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
4. SAMPLES COLLECTED BY MWH PERSONNEL IN APRIL, OCTOBER, NOVEMBER AND DECEMBER 2014.
5. CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER (μg/L) WITH THE EXCEPTION OF SULFATE, REPORTED IN MILLIGRAMS PER LITER (mg/L).
6. BOLDED VALUE INDICATES RG EXCEEDANCE.

Drawn By & Date: TLP 03/12/15
Approved By & Date:
Revised By & Date: RJR 03/12/15
Revised By & Date:
Approved By & Date:

RJR
DEVELOPED BY
TLP
DRAWN BY
APPROVED BY
03/12/2015
DATE
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 1200'

REV	DATE	BY	DESCRIPTION

EXPLOSIVES AND SULFATE DETECTIONS MANUFACTURING AREA – SITES M4, M5, M6, M7, M8, M9, M13 AND OTHER AREAS (2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

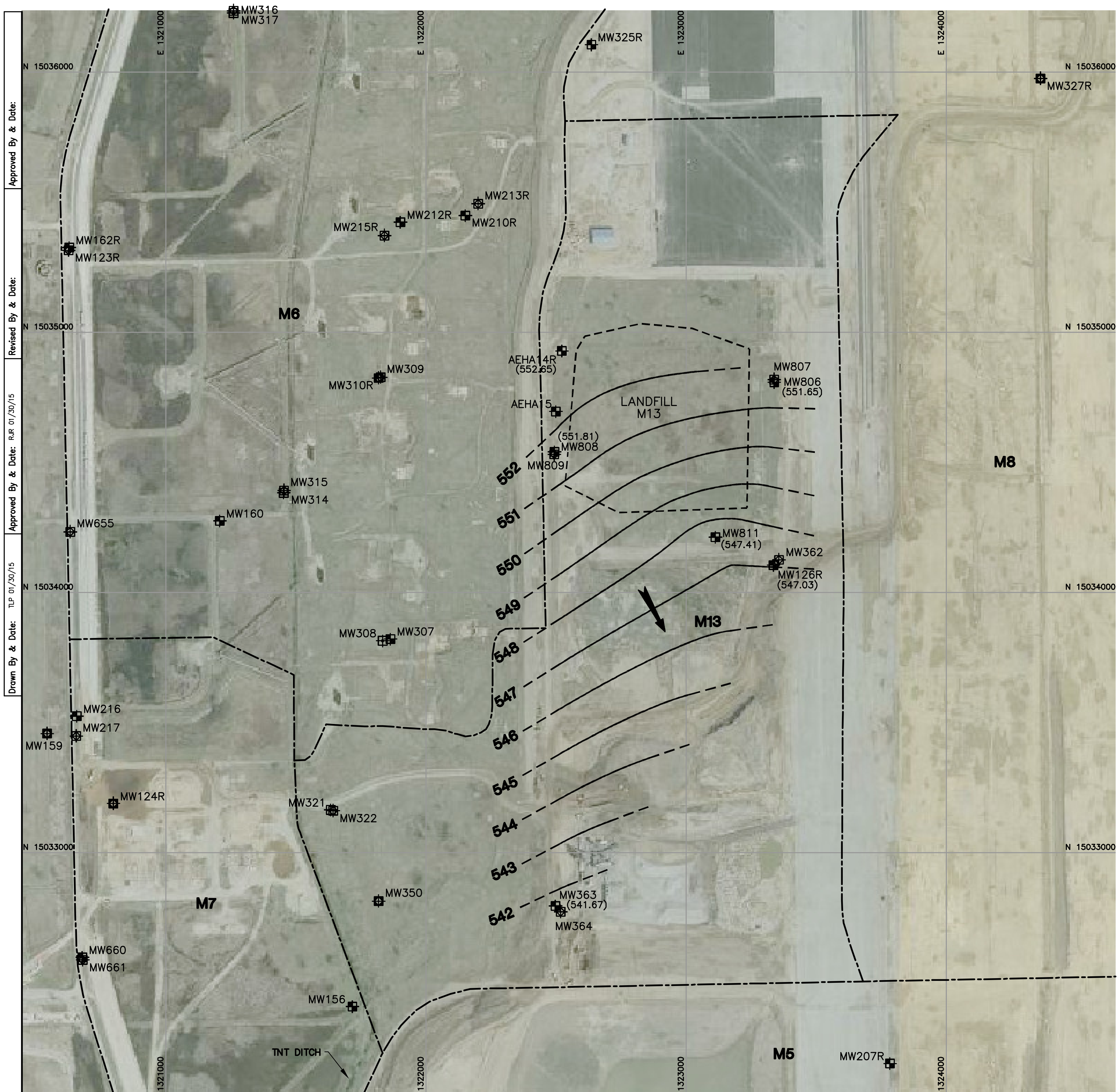
PRINTED
03/12/2015

FIGURE 3-18

DRAWING NUMBER
10506045
130101

MWH

Drawn By & Date: TLP 01/30/15
Approved By & Date: RJR 01/30/15
Revised By & Date:
Approved By & Date:



north

LEGEND

MW126R (547.03)	OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
MW350	COMBINED MONITORING WELL LOCATION AND NUMBER
MW356	SHALLOW BEDROCK MONITORING WELL LOCATION AND NUMBER
MW308	DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
550 ——	WATER TABLE CONTOUR (CONTOUR INTERVAL; 1 FT, DASHED WHERE INFERRED)
➔	DIRECTION OF WATER TABLE FLOW
—·—·—	STUDY AREA BOUNDARIES
- - - -	APPROXIMATE LIMITS OF LANDFILL

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD 83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON NOVEMBER 18, 2014.
4. MONITORING WELLS USED TO CREATE THE WATER TABLE MAP ARE SHOWN WITH ELEVATIONS.
5. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM A DRAWING, "M13 NEW WELL LOCATIONS", FIGURE 1, PROJECT NO. 7-61M-11686, PREPARED BY AMEC EARTH & ENVIRONMENTAL, DATED MAY 2008.

RJR	TLP	
DEVELOPED BY	DRAWN BY	
APPROVED BY	01/30/15	
	DATE	
CONTRACT NO. W9124J-14-P-0142		

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 400'

REV	DATE	BY	DESCRIPTION

SITE FEATURES/WATER TABLE MAP – MANUFACTURING AREA, SITE M13 LANDFILL (3RD QUARTER – NOVEMBER 2014)

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

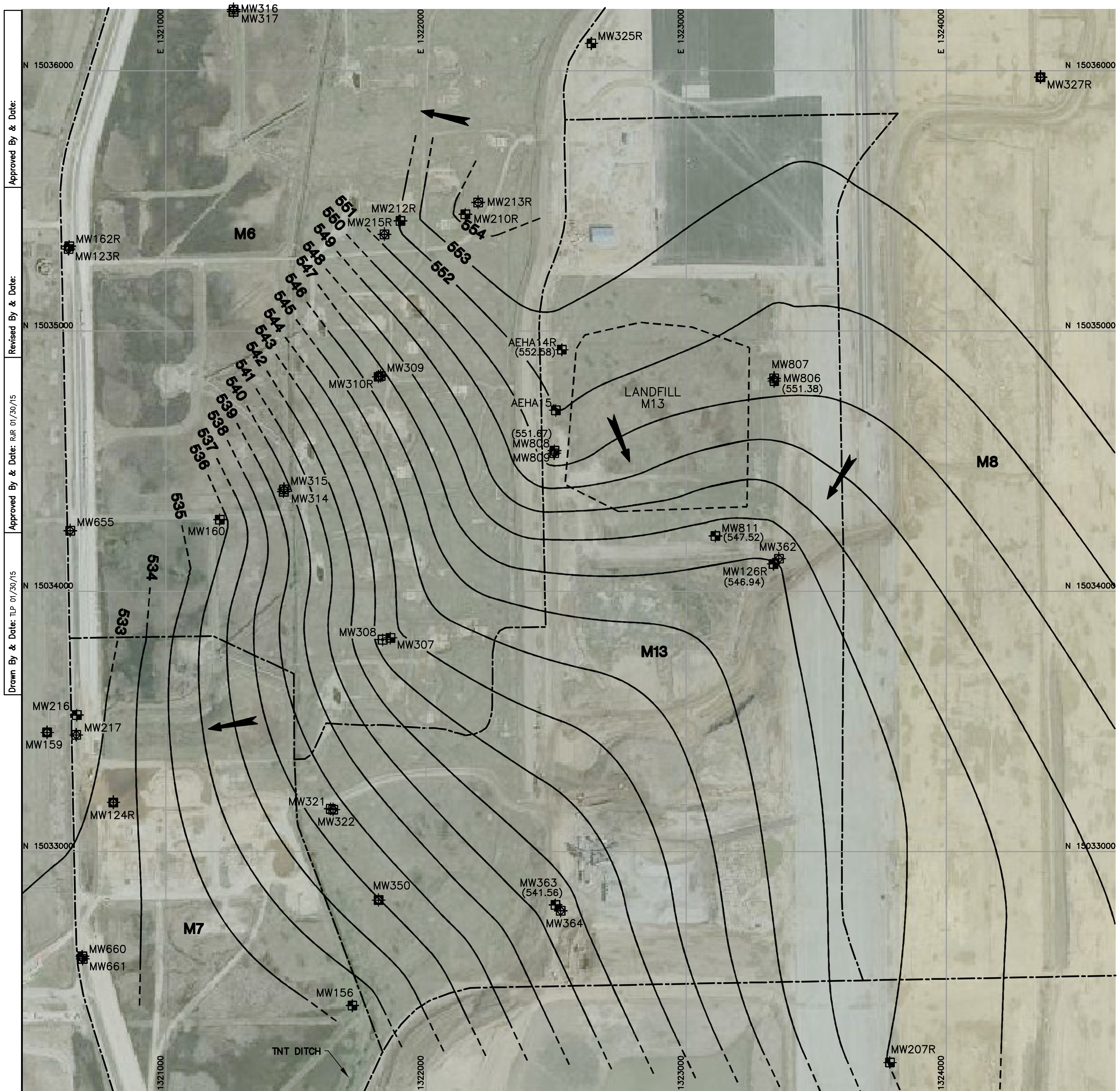
PRINTED
01/30/2015

FIGURE 3-19

DRAWING NUMBER
10506045
130101

USAEC

MWH



LEGEND

MW126R (546.94)	OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
MW350	COMBINED MONITORING WELL LOCATION AND NUMBER
MW356	SHALLOW BEDROCK MONITORING WELL LOCATION AND NUMBER
MW308	DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
550	WATER TABLE CONTOUR (CONTOUR INTERVAL; 1 FT, DASHED WHERE INFERRED)
	DIRECTION OF WATER TABLE FLOW
	STUDY AREA BOUNDARIES
	APPROXIMATE LIMITS OF LANDFILL

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD 83.
3. SEE FIGURE 3-16 FOR WATER TABLE CONFIGURATION OF AREA SURROUNDING LANDFILL M13.
4. WATER LEVELS MEASURED BY MWH PERSONNEL IN DECEMBER, 2014.
5. MONITORING WELLS USED TO CREATE THE WATER TABLE MAP ARE SHOWN WITH ELEVATIONS.
6. SEE FIGURE 3-16 FOR GROUNDWATER ELEVATIONS OF MONITORING WELLS AT SITES ADJACENT TO M13.
7. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM A DRAWING, "M13 NEW WELL LOCATIONS", FIGURE 1, PROJECT NO. 7-61M-11686, PREPARED BY AMEC EARTH & ENVIRONMENTAL, DATED MAY 2008.

north

Drawn By & Date: TLP 01/30/15
Approved By & Date: RJR 01/30/15
Revised By & Date:
Approved By & Date:

RJR DEVELOPED BY | TLP DRAWN BY | APPROVED BY | 01/30/15 DATE

CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 400'

REV	DATE	BY	DESCRIPTION

WATER TABLE MAP –
MANUFACTURING AREA, SITE M13 LANDFILL
(4TH QUARTER – DECEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED
01/30/2015

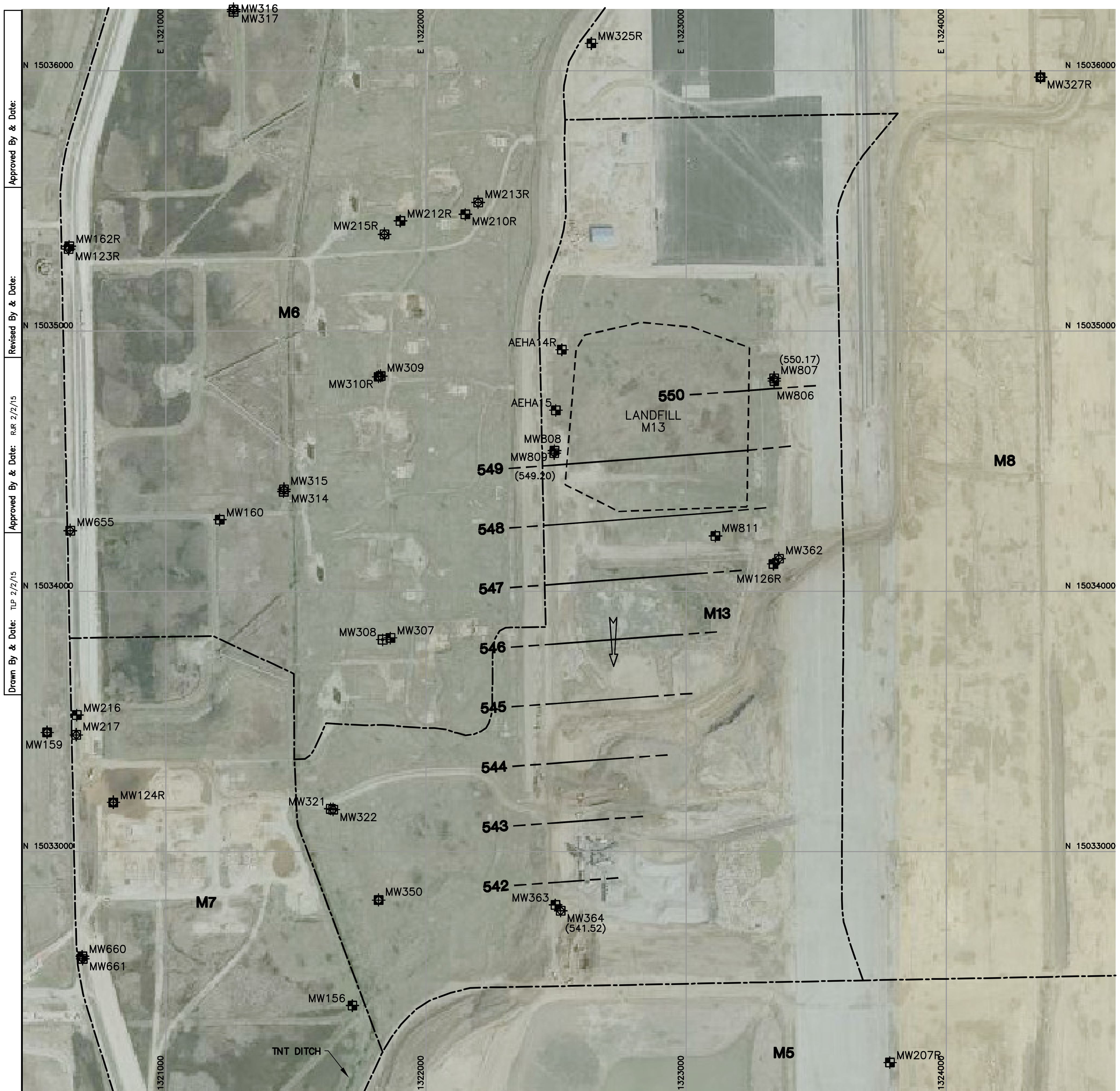
FIGURE 3-20

DRAWING NUMBER
10506045
130101

USAEC

MWH

Drawn By & Date: TLP 2/2/15
Approved By & Date: RJR 2/2/15
Revised By & Date:
Approved By & Date:



north

LEGEND

MW126R	OVERBURDEN MONITORING WELL LOCATION AND NUMBER
MW350	COMBINED MONITORING WELL LOCATION AND NUMBER
MW807 (550.17)	SHALLOW BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
MW308	DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
550	POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL; 1 FT, DASHED WHERE INFERRED)
	DIRECTION OF BEDROCK FLOW
	STUDY AREA BOUNDARIES
	APPROXIMATE LIMITS OF LANDFILL

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD 83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON NOVEMBER 18, 2014.
4. MONITORING WELLS USED TO CREATE THE POTENTIOMETRIC SURFACE MAP ARE SHOWN WITH ELEVATIONS.
5. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM A DRAWING, "M13 NEW WELL LOCATIONS", FIGURE 1, PROJECT NO. 7-61M-11686, PREPARED BY AMEC EARTH & ENVIRONMENTAL, DATED MAY 2008.

RJR DEVELOPED BY | TLP DRAWN BY
APPROVED BY | 2/2/15 DATE
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 400'

REV	DATE	BY	DESCRIPTION

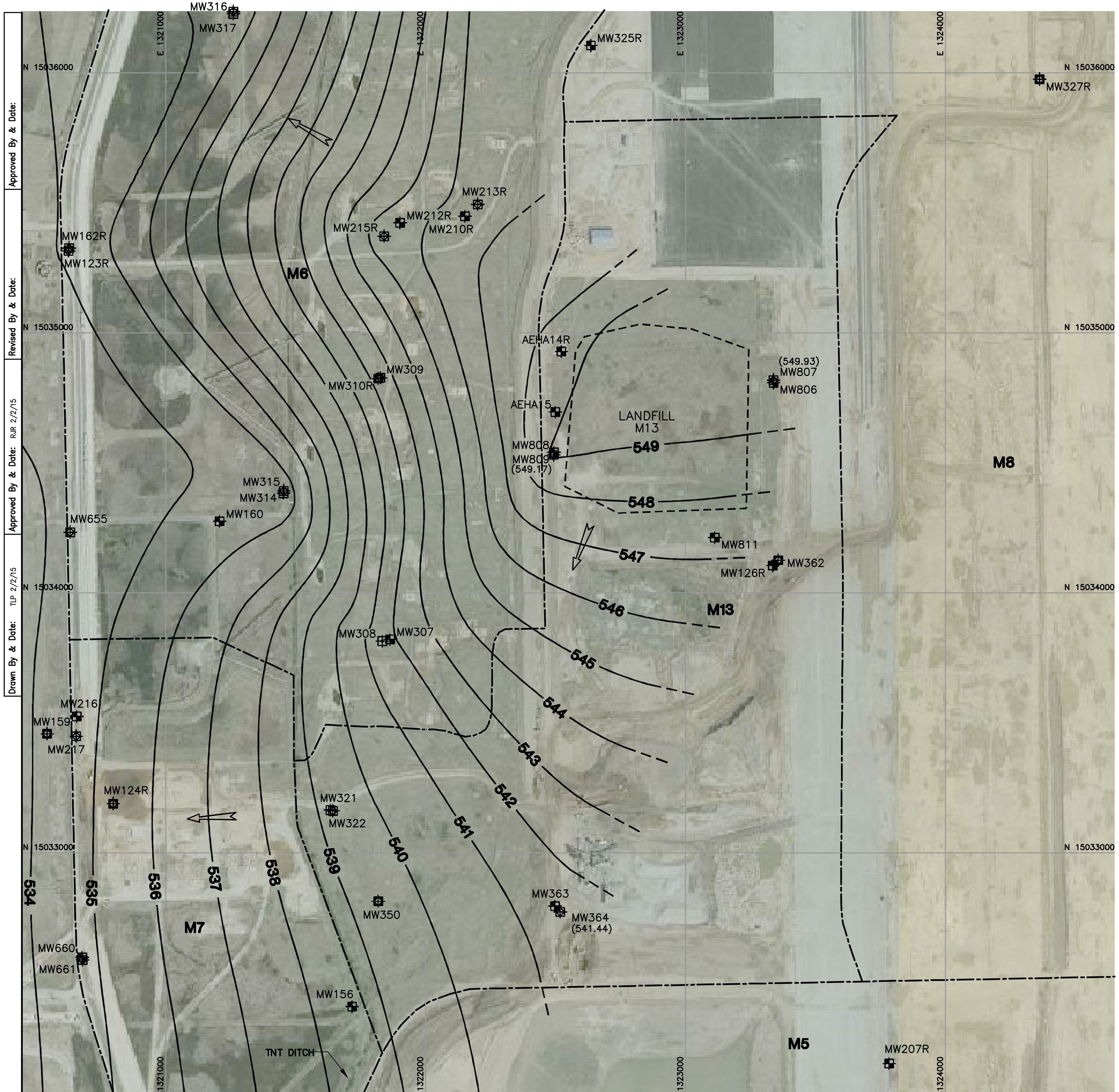
POTENTIOMETRIC SURFACE MAP – MANUFACTURING AREA, SITE M13 LANDFILL (3RD QUARTER – NOVEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 2/2/2015

FIGURE 3-21

DRAWING NUMBER
10506045
130101

MWH



LEGEND

- MW126R — OVERBURDEN MONITORING WELL LOCATION AND NUMBER
- MW350 — COMBINED MONITORING WELL LOCATION AND NUMBER
- MW807 (549.93) — SHALLOW BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
- MW308 — DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
- 545 — POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL; 1 FT, DASHED WHERE INFERRED)
- DIRECTION OF BEDROCK FLOW
- STUDY AREA BOUNDARIES
- APPROXIMATE LIMITS OF LANDFILL

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD 83.
3. SEE FIGURE 3-17 FOR POTENTIOMETRIC SURFACE CONFIGURATION OF AREA SURROUNDING LANDFILL M13.
4. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 15-16, 2014.
5. MONITORING WELLS USED TO CREATE THE POTENTIOMETRIC SURFACE MAP ARE SHOWN WITH ELEVATIONS.
6. SEE FIGURE 3-17 FOR GROUNDWATER ELEVATIONS OF MONITORING WELLS AT SITES ADJACENT TO M13.
7. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM A DRAWING, "M13 NEW WELL LOCATIONS", FIGURE 1, PROJECT NO. 7-61M-11686, PREPARED BY AMEC EARTH & ENVIRONMENTAL, DATED MAY 2008.

north

RJR DEVELOPED BY | TLP DRAWN BY | APPROVED BY | 2/2/15 DATE

CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE 0 1/2 1 — BAR REPRESENTS ONE INCH ON ORIGINAL — SCALE 1" = 400'

REV | DATE | BY | DESCRIPTION

POTENTIOMETRIC SURFACE MAP – MANUFACTURING AREA, SITE M13 LANDFILL (4TH QUARTER – DECEMBER 2014)

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

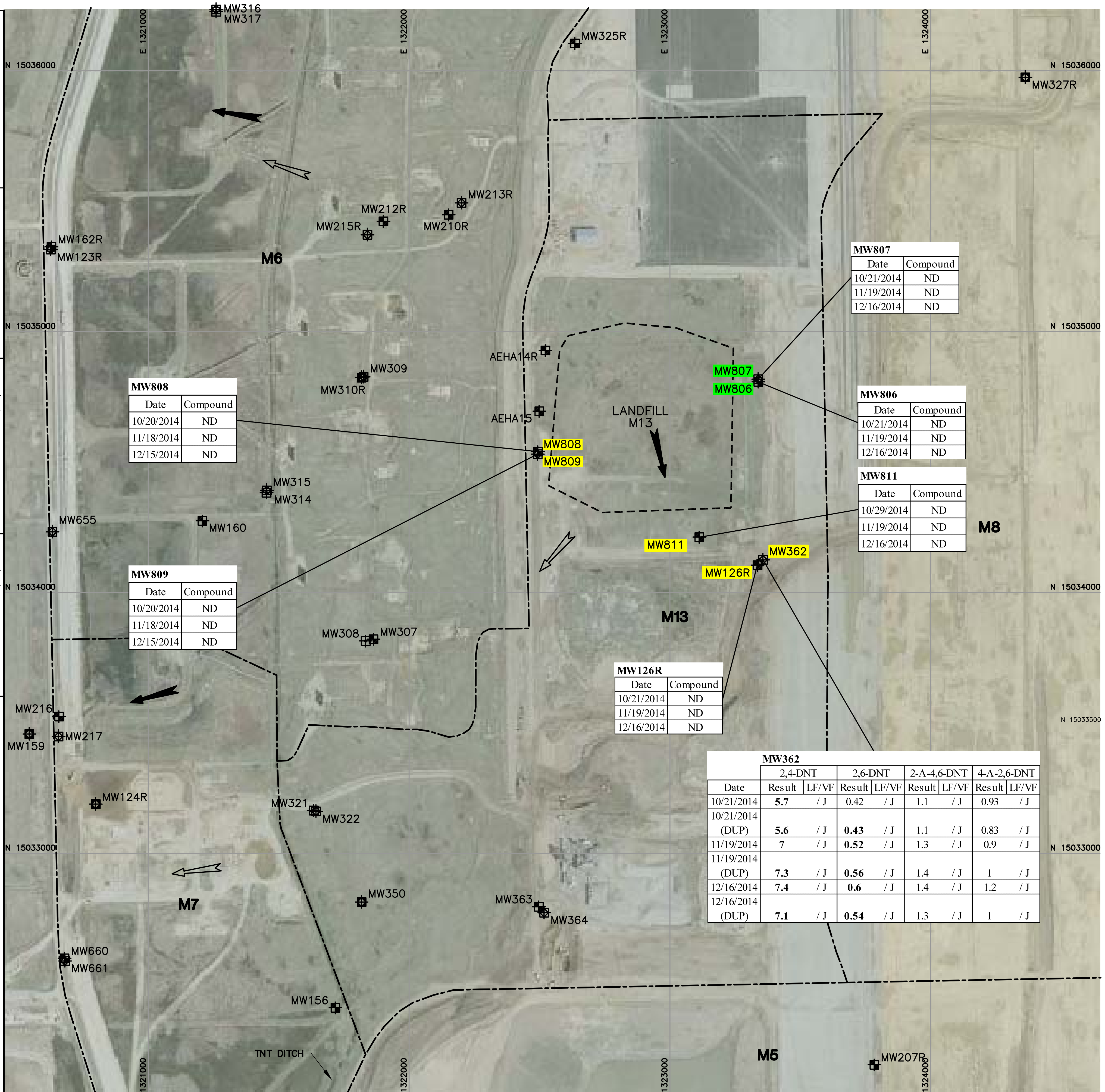
PRINTED 2/2/2015

FIGURE 3-22

DRAWING NUMBER 10506045 130101

USAEC

MWH



MW808	
Date	Compound
10/20/2014	ND
11/18/2014	ND
12/15/2014	ND

MW809	
Date	Compound
10/20/2014	ND
11/18/2014	ND
12/15/2014	ND

MW807	
Date	Compound
10/21/2014	ND
11/19/2014	ND
12/16/2014	ND

MW806	
Date	Compound
10/21/2014	ND
11/19/2014	ND
12/16/2014	ND

MW811	
Date	Compound
10/29/2014	ND
11/19/2014	ND
12/16/2014	ND

MW126R	
Date	Compound
10/21/2014	ND
11/19/2014	ND
12/16/2014	ND

MW362

	2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT	
Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
10/21/2014	**5.7**	/ J	0.42	/ J	1.1	/ J	0.93	/ J
10/21/2014 (DUP)	**5.6**	/ J	**0.43**	/ J	1.1	/ J	0.83	/ J
11/19/2014	**7**	/ J	**0.52**	/ J	1.3	/ J	0.9	/ J
11/19/2014 (DUP)	**7.3**	/ J	**0.56**	/ J	1.4	/ J	1	/ J
12/16/2014	**7.4**	/ J	**0.6**	/ J	1.4	/ J	1.2	/ J
12/16/2014 (DUP)	**7.1**	/ J	**0.54**	/ J	1.3	/ J	1	/ J

LEGEND

MW126R	OVERBURDEN MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
MW327R	COMBINED MONITORING WELL LOCATION AND NUMBER
MW362	SHALLOW BEDROCK MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
MW308	DEEPER BEDROCK MONITORING WELL LOCATION AND NUMBER
	DOWNGRADIENT MONITORING POINT
	UPGRADIENT MONITORING POINT
	DIRECTION OF WATER TABLE FLOW
	DIRECTION OF BEDROCK FLOW
	STUDY AREA BOUNDARIES
	APPROXIMATE LIMITS OF LANDFILL
<	RESULT SHOWS LAB LIMIT FOR NON-DETECTED RESULTS
2,4-DNT	2,4-DINITROTOLUENE
2,6-DNT	2,6-DINITROTOLUENE
2-A-4,6-DNT	2-AMINO-4,6-DINITROTOLUENE
4-A-2,6-DNT	4-AMINO-2,6-DINITROTOLUENE
DUP	DUPLICATE
LF/VF	LAB FLAG/VALIDATION FLAG
/J	ESTIMATED CONCENTRATION
ND	NOT DETECTED
NS	NO STANDARD
RG	REMEDIATION GOAL

Compound	Project Action Limit(1)	Surface Water RG
2,4-DNT	0.42	330
2,6-DNT	0.42	150
2-A-4,6-DNT	NS	NS
4-A-2,6-DNT	NS	NS

NOTES

1. REMEDIATION GOAL (PROJECT ACTION LIMITS) OBTAINED FROM WORKSHEET #15 OF APPENDIX B (QAPP) OF THE FINAL LONG TERM MONITORING PLAN (TOLTEST, 2010). IEPA CLASS II GROUNDWATER STANDARDS FOR INDUSTRIAL USES ARE PRESENTED WHERE CLASS I AND CLASS II STANDARDS (POTABLE AND INDUSTRIAL USES, RESPECTIVELY) WERE BOTH AVAILABLE.
2. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
3. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
4. SAMPLES COLLECTED BY MWH PERSONNEL IN OCTOBER, NOVEMBER AND DECEMBER 2014.
5. CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER ($\mu g/L$).
6. BOLDED VALUE INDICATES RG EXCEEDANCE.
7. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM A DRAWING, "M13 NEW WELL LOCATIONS", FIGURE 1, PROJECT NO. 7-61M-11686, PREPARED BY AMEC EARTH & ENVIRONMENTAL, DATED MAY 2008.

Drawn By & Date: TLP 03/12/15
Approved By & Date: RJR 03/12/15
Revised By & Date:
Approved By & Date:

DEVELOPED BY RJR
DRAWN BY TLP
APPROVED BY
DATE 03/12/15
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 400'

REV | DATE | BY | DESCRIPTION

EXPLOSIVES DETECTIONS – MANUFACTURING AREA, SITE M13 LANDFILL (2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 03/12/2015

FIGURE 3-23

DRAWING NUMBER 10506045 130101

MWH

LEGEND

MW647	OVERBURDEN MONITORING WELL LOCATION AND NUMBER
MW802 (536.70)	COMBINED MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
MW335 (532.34)	SHALLOW BEDROCK MONITORING WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
530	WATER TABLE CONTOUR (CONTOUR INTERVAL; 1 FT, DASHED WHERE INFERRED)
	DIRECTION OF WATER TABLE FLOW
	DIRECTION OF FLOW IN PRAIRIE CREEK
	STUDY AREA BOUNDARY
	APPROXIMATE LIMITS OF LANDFILL

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD 83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 15, 2014.
4. MONITORING WELLS USED TO CREATE THE WATER TABLE MAP ARE SHOWN WITH ELEVATIONS.
5. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM A DRAWING, "M11 NEW WELL LOCATIONS", PROJECT NO. 7-61M-11686, PREPARED BY AMEC EARTH & ENVIRONMENTAL, DATED JANUARY 2008.
6. MW335, MW336 AND MW804 ARE SHALLOW BEDROCK WELLS, AND MW802 IS A COMBINATION OVERBURDEN/BEDROCK WELL USED AS A HORIZONTAL CONTROL POINT.

north

Drawn By & Date: TLP 01/30/15
Approved By & Date: RJR 01/30/15
Revised By & Date:
Approved By & Date:

RJR DEVELOPED BY
TLP DRAWN BY
APPROVED BY
01/30/15 DATE
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 500'

REV	DATE	BY	DESCRIPTION

SHALLOW POTENTIOMETRIC SURFACE MAP – MANUFACTURING AREA, SITE M11 LANDFILL (4TH QUARTER – DECEMBER 2014)
2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 01/30/15

FIGURE 3-24

DRAWING NUMBER
10506045
130101

MWH

LEGEND

MW647	OVERBURDEN MONITORING WELL LOCATION AND NUMBER
MW802	COMBINED MONITORING WELL LOCATION AND NUMBER
MW803 (541.09)	SHALLOW BEDROCK MONITORING WELL LOCATION, NUMBER, AND POTENTIOMETRIC SURFACE ELEVATION
536	POTENTIOMETRIC SURFACE CONTOUR (CONTOUR INTERVAL; 2 FT, DASHED WHERE INFERRED)
	DIRECTION OF BEDROCK FLOW
	DIRECTION OF FLOW IN PRAIRIE CREEK
	STUDY AREA BOUNDARY
	APPROXIMATE LIMITS OF LANDFILL

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
2. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD 83.
3. WATER LEVELS MEASURED BY MWH PERSONNEL ON DECEMBER 15, 2014.
4. MONITORING WELLS USED TO CREATE THE POTENTIOMETRIC SURFACE MAP ARE SHOWN WITH ELEVATIONS.
5. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM A DRAWING, "M11 NEW WELL LOCATIONS", PROJECT NO. 7-61M-11686, PREPARED BY AMEC EARTH & ENVIRONMENTAL, DATED JANUARY 2008.

north

Drawn By & Date: TLP 01/30/15
Approved By & Date:
Revised By & Date: RJR 01/30/15
Approved By & Date:
Revised By & Date:
Approved By & Date:

RJR
DEVELOPED BY
TLP
DRAWN BY
APPROVED BY
01/30/15
DATE
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 500'

REV	DATE	BY	DESCRIPTION

DEEP POTENTIOMETRIC SURFACE MAP – MANUFACTURING AREA, SITE M11 LANDFILL (4TH QUARTER – DECEMBER 2014)

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 01/30/2015

FIGURE 3-25

DRAWING NUMBER
10506045
130101

MWH

MW333

Date	Explosives Result	Sulfate Result	LF/VF
12/15/2014	ND	75	

MW804

Date	2-A-4,6-DNT Result	LF/VF	4-A-2,6-DNT Result	LF/VF	Sulfate Result	LF/VF
12/11/2014	0.066	F / J	0.16	F / J	240	

MW805

Date	Explosives Result	Sulfate Result	LF/VF
12/11/2014	ND	**450**	

MW334

Date	Explosives Result	Sulfate Result	LF/VF
12/15/2014	ND	190	

MW335

Date	Explosives Result	Sulfate Result	LF/VF
12/11/2014	ND	**480**	
12/11/2014 (DUP)	ND	**490**	

MW803

Date	Explosives Result	Sulfate Result	LF/VF
12/15/2014	ND	90	

MW802

Date	Explosives Result	Sulfate Result	LF/VF
12/11/2014	ND	200	

MW336

Date	Explosives Result	Sulfate Result	LF/VF
12/11/2014	ND	340	

LEGEND

MW647	OVERBURDEN MONITORING WELL LOCATION AND NUMBER
MW802	COMBINED MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
MW803	SHALLOW BEDROCK MONITORING WELL LOCATION, NUMBER, AND EXPLOSIVES DETECTIONS
	DOWNGRADIENT MONITORING POINT
	UPGRADIENT MONITORING POINT
	DIRECTION OF WATER TABLE FLOW
	DIRECTION OF BEDROCK FLOW
	DIRECTION OF FLOW IN PRAIRIE CREEK
	STUDY AREA BOUNDARY
	APPROXIMATE LIMITS OF LANDFILL
2-A-4,6-DNT	2-AMINO-4,6-DINITROTOLUENE
4-A-2,6-DNT	4-AMINO-2,6-DINITROTOLUENE
DUP	DUPLICATE
F/	CONCENTRATION BELOW THE REPORTED DETECTION LIMIT
/J	ESTIMATED CONCENTRATION
LF/VF	LAB FLAG/VALIDATION FLAG
NS	NO STANDARD
RG	REMEDIATION GOAL

Compound	Project Action Limit(1)	Surface Water RG
2-A-4,6-DNT	NS	NS
4-A-2,6-DNT	NS	NS
Sulfate	400	NS

NOTES

1. REMEDIATION GOAL (PROJECT ACTION LIMITS) OBTAINED FROM WORKSHEET #15 OF APPENDIX B (QAPP) OF THE FINAL LONG TERM MONITORING PLAN (TOLTEST, 2010). IEPA CLASS II GROUNDWATER STANDARDS FOR INDUSTRIAL USES ARE PRESENTED WHERE CLASS I AND CLASS II STANDARDS (POTABLE AND INDUSTRIAL USES, RESPECTIVELY) WERE BOTH AVAILABLE.
2. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH OBTAINED FROM WEBSITE HTTP://TERRASERVER-USA.COM, DATED APRIL 10, 2002.
3. COORDINATE SYSTEM BASED ON: DATUM UTM FEET, ZONE 16 (EAST), NAD83.
4. SAMPLES COLLECTED BY MWH PERSONNEL IN DECEMBER 2014.
5. CONCENTRATIONS REPORTED IN MILLIGRAMS PER LITER (mg/L).
6. APPROXIMATE LIMITS OF LANDFILL OBTAINED FROM A DRAWING, "M11 NEW WELL LOCATIONS", PROJECT NO. 7-61M-11686, PREPARED BY AMEC EARTH & ENVIRONMENTAL, DATED JANUARY 2008.

north

Drawn By & Date: TLP 03/12/15
Approved By & Date: RJR 03/12/15
Revised By & Date:
Approved By & Date:

TLP DRAWN BY
03/12/15 DATE
RJR DEVELOPED BY
APPROVED BY
CONTRACT NO. W9124J-14-P-0142

VERIFY SCALE
0 1/2 1
BAR REPRESENTS ONE INCH ON ORIGINAL
SCALE 1" = 500'

REV	DATE	BY	DESCRIPTION

EXPLOSIVES AND SULFATE DETECTIONS – MANUFACTURING AREA, SITE M11 LANDFILL (4TH QUARTER – DECEMBER 2014)

2014 ANNUAL GROUNDWATER MONITORING REPORT
JOLIET ARMY AMMUNITION PLANT
WILL COUNTY, ILLINOIS

PRINTED 03/12/2015

FIGURE 3-26

DRAWING NUMBER 10506045 130101

MWH

APPENDIX A

LANDFILL INSPECTION REPORTS

A1 – Post-closure Landfill Inspection Report Third Quarter (November) 2014
A2 – Post-closure Landfill Inspection Report Fourth Quarter (December) 2014

A1 - POST-CLOSURE LANDFILL INSPECTION REPORT THIRD QUARTER (NOVEMBER) 2014

Former Joliet Army Ammunition Plant
Will County, Illinois

Post-closure Landfill Inspection Report
Third Quarter (November) 2014

Long-Term Monitoring for Multiple Groundwater Sites

Prepared For:
U.S. Army Environmental Command

Firm Fixed Price Contract
W9124J-14-P-0142

November 2014

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Appendix

A Post-closure Inspection Checklists

B Inspection Photographs

ACRONYMS AND ABBREVIATIONS

COC	contaminants of concern
GMZ	Groundwater Management Zone
IAC	Illinois Administrative Code
JOAAP	former Joliet Army Ammunition Plant
LAP	Load-Assemble-Package Area
LTM Plan	Final Long-term Monitoring Plan for Environmental Remediation Services (TolTest/MWH, March 2010)
MFG	Manufacturing Area
MWH	MWH Americas, Inc.
PWS	Performance Work Statement
RA	remedial action
Report	Post-closure Landfill Inspection Report, Third Quarter (November) 2014
TolTest	TolTest, Inc.
USAEC	United States Army Environmental Command

1.0 INTRODUCTION

MWH Americas, Inc. (MWH) has been retained by the United States Army Environmental Command (USAEC) to conduct environmental remediation services at the former Joliet Army Ammunition Plant (JOAAP), Will County, Illinois. Work was executed under firm fixed-price contract number W9124J-14-P-0142. MWH performed tasks in accordance with the Performance Work Statement (PWS) dated 27 August 2014 which includes quarterly inspection of the condition of Landfills L3, M11, and M13 located at JOAAP. This Post-closure Landfill Inspection Report, Third Quarter (November) 2014 (Report) documents the conditions identified during the inspection of the landfills conducted in November 2014.

Post-closure monitoring requirements for Landfills L3, L11, and M13 are mandated by Illinois Administrative Code (IAC) Title 5, Subtitle G, Chapter 1, Subchapter c, Part 724, Subpart G for 15 years at Landfill M13 and 30 years at Landfills L3 and M11.

According to the *Final Long-term Monitoring Plan for Environmental Remediation Services* (LTM Plan [TolTest/MWH, March 2010]):

- Section 4.2.1.3.2, *"According to IAC, the Landfill L3 cover will be inspected on a quarterly basis…"*
- Section 4.2.2.3.2, *"According to IAC, the Landfill M11 cover will be inspected quarterly for the first five years and then annually for 25 years."*
- Section 4.2.3.2, *"Long-term monitoring of the landfill cap (M13) will include quarterly inspections of the cap, …"*

Landfill inspections have been conducted on a quarterly basis at Landfills L3, M11, and M13 from October 2008 through July 2013 in accordance with the LTM Plan. Inspection of Landfills L3, M11, and M13 were conducted by TolTest, Inc. (TolTest) in October 2013. However, the Post-closure Inspection Report was not received from TolTest prior to their bankruptcy. Additionally, TolTest did not conduct landfill inspections in January 2014 prior to their bankruptcy. Landfill inspections were conducted by MWH in October and November 2014. The Post-closure Landfill Inspection Report, Second Quarter (October) 2014 is included in the *Draft 2014 Semi-annual Groundwater Monitoring Report* (MWH, January 2015).

The October 2013 landfill inspection at M11 would have completed the first five years of quarterly inspections (October 2008 through October 2013). According to Sections 4.2.2.2 and 4.2.2.3.2 of the LTM Plan, Landfill M11 is required to have quarterly inspections completed for the first five years, and annually thereafter. As stated in the *Draft Final 2013 Annual Groundwater Monitoring Report* (MWH, January 2015) currently in review, *"Quarterly inspections of the landfill cap at Site M11 were required for the first five years, then annually thereafter. However, due to the missing inspection report from October 2013, when the landfill was mowed for the first time, quarterly inspections will continue through 2014."*

Inspection objectives include:

- Confirm that the landfill cap has controlled leaching so that water quality will not be threatened in the future.
- Ensure that the cap is maintained in a manner that will not increase infiltration in the future or otherwise allow waste to be exposed.
- Keep survey points protected and visible to facilitate identification in the future.
- At M13 ensure the fence and signage installed to restrict site access remain in place and serviceable.
- At M13 certify that institutional controls remain in place.

According to IAC and the LTM Plan, Landfills L3, M11, and M13 covers will be inspected on a quarterly basis for:

- Depressions indicating subsidence or other deformations that could breach the cover.
- Erosion features.
- Growth of deep rooted vegetation or invasive species that would adversely affect evapotranspiration and/or erosion armoring.
- Debris or blockage of drainage structure.

Any damages or changes noted will be repaired to comply with the final design specifications for the cover.

In addition, land use restrictions have been imposed across the area within the fence. Annual certification is required to document that none of the following are occurring within the fence:

- Development
- Intrusive work
- Excavation that could mobilize contaminants of concern (COC)
- Alteration of surface water flow
- Vehicle use other than that associated with maintenance of the cover/cap.

2.0 LANDFILL DESCRIPTIONS

2.1 LANDFILL L3

Site L3 comprises approximately 50 acres used as a demolition area located in the Load-Assemble-Package Area (LAP) located on the east side of Highway 53. Site L3 is bounded on the west by Prairie Creek, the south by an unnamed tributary of Prairie Creek, and the east by Star Grove Cemetery. Predominant use of the area was for open burning of combustibles and munitions crates, including some materials with low level explosive contamination. An air curtain destructor was constructed at the site to reduce emissions, but was never put into use. There was also a one-acre fire training area at the site, which consisted of a small depression surrounded by an earthen berm. Specific burning units included “U” and “L” shaped burn pads and a burn cage on a concrete slab. The remedial action (RA) selected for the Site L3 was consolidation and capping into what is now called Landfill L3. Implementation of the remedy began in 2007 and was completed in 2008.

Landfill L3 occupies approximately 3.3 acres of the Site L3 area. Landfill L3 is located on the western edge of the Site L3 Groundwater Management Zone (GMZ) on the east bank of Prairie Creek. The current conceptual site model is that Landfill L3 is believed to contain metals and explosive residues that could continue to contaminate the underlying groundwater and migrate to Prairie Creek. With the implementation of the RA at Site L3, it is anticipated that the landfill cap will prevent percolation of precipitation through waste consolidated in the landfill. Because the landfill is bordered by Prairie Creek, any contamination that infiltrates from the filled area would be expected to migrate to Prairie Creek and discharge as the groundwater flows upward into the surface water body.

2.1.1 Monitoring Locations

Both groundwater and surface water sample points were monitored at Landfill L3 during the 2nd and 4th quarterly sampling events in 2014 as follows:

- Upgradient Locations
  - SW004 (Surface location where Prairie Creek first enters the L3 GMZ boundary and upstream of the storm water outfall, 2nd quarter only).
- Downgradient Locations
  - MW410
  - MW412
  - MW630
  - MW631
  - MW633
  - SW777 (Surface water location in Prairie Creek near the L3 GMZ boundary)

- SW557 (Surface water location in Prairie Creek just upstream of the landfill drainage swale discharge)
- SW558 (Surface water location at the constructed drainage swale along the southwest side of the landfill)

2.2 LANDFILL M11

Site M11 comprises approximately 133 acres and is located in the southwestern portion of the Manufacturing Area (MFG) located on the west side of Highway 53. Site M11 was divided into two sections by School House Road and bordered on the west by West Patrol Road. M11 north encompassed approximately 10.5 acres of former gravel pits that were mined and filled with waste. M11 south, a former gravel pit, encompassed approximately 5.6 acres that was also mined and filled with waste. The remedy selected for Site M11 was waste consolidation and capping into what is now called Landfill M11. Implementation of the remedy began in 2006 and was completed in 2008.

Landfill M11 occupies approximately 10.5 acres of the Site M11 north area. There is no GMZ associated with Landfill M11. The current conceptual site model is that Landfill M11 is believed to contain manganese and sulfate containing waste that could potentially contaminate underlying groundwater. With the implementation of the RA at Site M11, it is anticipated that the landfill cap will prevent percolation of precipitation through waste consolidated in the landfill, thus preventing groundwater contamination.

2.2.1 Monitoring Locations

Groundwater sample points are monitored at Landfill M11 during the 4th quarterly sampling event in 2014 as follows:

- Upgradient Locations
  - MW802
  - MW803
- Downgradient Locations
  - MW333
  - MW334
  - MW335
  - MW336
  - MW804
  - MW805

2.3 LANDFILL M13

Site M13 comprises approximately 106 acres of the central part of the MFG area formerly known as the gravel pits. It lies north of the Tetryl Production Area, east of the TNT Ditch Complex, and west of the Acid Area. Disposal activities were confined to four discrete areas of the site, none of which extended beyond 12 acres in size. Historical records indicate landfilling took place in the Northern Gravel Pit during the period 1966 to 1984 and involved scrap metals, creosote-treated railroad ties, telephone poles, and construction/demolition debris. The three other pits received waste materials that do not appear to pose a threat to human health and the environment. The RA selected for the Site M13 was consolidation and capping into what is now called Landfill M13. Implementation of the remedy began in 2007 and was completed in 2008.

Landfill M13 comprises approximately 10.2 acres and is located in the northern part of Site M13 and within the MFG GMZ. The current conceptual site model is that metals and benzo(a)pyrene in groundwater may be present as a result of leaching of waste materials in the Northern Gravel Pit. The explosives present in groundwater are far more likely to be present due to infiltration of wastewater in the TNT Ditch. There is no evidence to suggest explosive compounds were ever present in waste materials put into the pit. With the implementation of the RA at Site M13, it is anticipated that the landfill cap will prevent percolation of precipitation through waste consolidated in the landfill and it is anticipated that contaminants in site groundwater will detach from the source areas and migrate as legacy plumes to the west. As such, concentrations are expected to decline with time.

2.3.1 Monitoring Locations

Groundwater is monitored quarterly through sample collection and analysis at seven monitoring wells:

- Upgradient or background wells
  - MW806
  - MW807
- Downgradient or source control wells
  - MW126R
  - MW362
  - MW808
  - MW809
  - MW811 (installed October 2014)

3.0 INSPECTION RESULTS

Landfill inspections were conducted on 18 November 2014 for Landfills L3, M11, and M13. This report includes copies of the inspection checklist, photographs, and recommendations. The Post-closure Inspection Checklists are found in Appendix A, and Inspection Photographs are found in Appendix B.

3.1 LANDFILL L3

The cap for Landfill L3 was mowed in October 2014. The vegetative cover was well established. During the inspection, observations indicated that during mowing in October 2014 some of the vegetation was “laid-down” by the mower and not cut by the blades due to its length. The vegetation that was cut was between approximately 4 to 6 inches in height.

The perimeter fence and site postings were in good condition. No evidence of damage due to burrowing animals was observed.

The rip rap along Prairie Creek at Site L3 has been washed away at several locations and is in need of repair. Although small areas of the synthetic cap is exposed at several locations as a result of the rip rap being washed away, the landfill appears to be stable and does not appear to be failing. The remaining rip rap also appears to be stable.

During the inspection there was no indication of the following:

- Depressions indicating subsidence or other deformations that could breach the cover.
- Erosion features.
- Debris or blockage of drainage structure.

During the inspection there was no indication of the following activities:

- Development
- Intrusive work
- Excavation that could mobilize COCs
- Alteration of surface water flow
- Vehicle use other than that associated with maintenance of the cover/cap.

3.2 LANDFILL M11

The cap for Landfill M11 was mowed in October 2014. The vegetative cover was well established. During the inspection, observations indicated that during mowing some of the vegetation was “laid-down” by the mower and not cut by the blades due to its length. The vegetation that was cut was between approximately 4 to 6 inches in height. Additionally, the rip rap along the perimeter of the landfill was mowed to the extent possible. However, following mowing, some of the larger woody growth in the rip rap which could not be cut using the mower remains (see photos, Appendix B).

The perimeter fence and site postings were in good condition. No evidence of damage due to burrowing animals was observed.

During the inspection there was no indication of the following:

- Depressions indicating subsidence or other deformations that could breach the cover.
- Erosion features.
- Debris or blockage of drainage structure.

During the inspection there was no indication of the following activities:

- Development
- Intrusive work
- Excavation that could mobilize COCs
- Alteration of surface water flow
- Vehicle use other than that associated with maintenance of the cover/cap.

3.3 LANDFILL M13

The cap for Landfill M13 was mowed October 2014. The vegetative cover was well established. During the inspection, observations indicated that during mowing some of the vegetation was “laid-down” by the mower and not cut by the blades due to its length. The vegetation that was cut was between approximately 4 to 6 inches in height. Additionally, the rip rap along the perimeter of the landfill was mowed to the extent possible. However, following mowing, some of the larger woody growth in the rip rap which could not be cut using the mower remains (see photos, Appendix B). Additionally, the area between the Landfill M13 fence and the rip rap surrounding the landfill cap is becoming quite overgrown with grasses, shrubs, and small trees.

The perimeter fence and site postings were in good condition. No evidence of damage due to burrowing animals was observed.

During the inspection there was no indication of the following:

- Depressions indicating subsidence or other deformations that could breach the cover.
- Erosion features.

A drainage ditch located on the south side of the landfill periodically has standing water due to poor drainage. The ditch is filling with plants and sediments.

During the inspection there was no indication of the following activities:

- Development
- Intrusive work
- Excavation that could mobilize COCs
- Alteration of surface water flow (see above)
- Vehicle use other than that associated with maintenance of the cover/cap

4.0 RECOMMENDATIONS

The deficiencies noted within this Report which need to be addressed include the following:

Landfill L3:

- Repair rip rap along Prairie creek. The Army is currently preparing the contract documentation necessary for implementation of the repairs. Field work is currently scheduled to begin in August 2015.
- During the next mowing event scheduled for December 2014, mowing should be conducted in the opposite direction as completed in October 2014 to aid in attaining a consistent and proper cut height.
- Scattered woody plants observed on the landfill cap should be spot treated using 2,4-D once the growing season resumes.

Landfill M11:

- The October 2013 landfill inspection at M11 would have completed the first five years of quarterly inspections (October 2008 through October 2013). According to Sections 4.2.2.2 and 4.2.2.3.2 of the LTM Plan, Landfill M11 is required to have quarterly inspections completed for the first five years, and annually thereafter. As stated in the *Draft Final 2013 Annual Groundwater Monitoring Report* (MWH, January 2015) currently in review, *"Quarterly inspections of the landfill cap at Site M11 were required for the first five years, then annually thereafter. However, due to the missing inspections report from October 2013, when the landfill was mowed for the first time, quarterly inspections will continue through 2014."* Following the inspection scheduled for December 2014, inspections at Landfill M11 will be reduced to annual only (4th quarter) in accordance with the LTM Plan. However, maintenance activities such as mowing will continue to be conducted on the same schedule as Landfills L3 and M13.
- During the next mowing event scheduled for December 2014, mowing should be conducted in the opposite direction as completed in October 2014 to aid in attaining a consistent and proper cut height.
- Some woody growth was observed in the rip rap on the south side of the landfill. During the next mowing event scheduled for December 2014, small trees will be removed from the rip rap.
- Scattered woody plants observed on the landfill cap should be spot treated using 2,4-D once the growing season resumes.

Landfill M13:

- During the next mowing event scheduled for December 2014, mowing should be conducted in the opposite direction as completed in October to aid in attaining a consistent and proper cut height.

- During the next mowing event scheduled for December 2014, small trees will be removed from the rip rap.
- Scattered woody plants observed on the landfill cap should be spot treated using 2,4-D once the growing season resumes.
- Although the landfill cap was mowed, the overgrowth within the Landfill M13 fenced area and surrounding the perimeter rip rap is limiting access to the landfill. Additionally, having such a dense overgrowth of seed sources in close proximity to the landfill, there will continue to be a high occurrence of invading species. Therefore, additional mowing should be conducted surrounding the landfill, including the drainage ditch located on the south side of the landfill.
- Following the fence-to-fence mowing, the drainage ditch on the south side of the landfill should be inspected. Some aerial photographs indicate the area may actually be intended for retention of surface water. If not, the drainage may need to be modified to eliminate the retention of surface water.

Appendix A
Post-Closure Inspection Checklists

Landfill L3

JOAAP LANDFILL INSPECTION CHECKLIST

Landfill Designation: L3	Date of Inspection: November 18, 2014
Inspected By: Jeff Ramsby, MWH Americas, Inc.	Weather Conditions: Pt. cloudy, windy, 17 deg.
Names of those present at inspection: None	

Checklist	Yes	No	Explanation
Site Security			
a) Was fencing, gates and signs in good condition?	√		
b) Were gates locked?	√		
c) Evidence of trespassing		√	
Landfill Cover			
d) Evidence of Settling and/or Ponding?		√	
e) Any desiccation or cracking detected?		√	
f) Erosion around cap?		√	
g) Animal Burrowing detected?		√	
Vegetation Condition			
h) Is vegetation well established?	√		
i) Evidence of vegetation detrimental to cap?	√		Some woody vegetation present in rip rap
Landfill structures			
j) Evidence of damage to monitoring wells?		√	
k) Evidence of damage to gas vents?		NA	No vents
Field Conclusions			
l) Is there an imminent hazard to the integrity of the unit?		√	
m) Are repairs necessary?	√		Rip Rap along creek needs repairs, woody vegetation to be removed

Certification	
Inspector Signature:	Printed Name: Jeff Ramsby
Title: Lead Supervising Hydrogeologist	Date: November 18, 2014

Landfill M11

JOAAP LANDFILL INSPECTION CHECKLIST			
Landfill Designation: M11		Date of Inspection: November 18, 2014	
Inspected By: Jeff Ramsby, MWH Americas, Inc.		Weather Conditions: Pt. cloudy, windy, 17 deg.	
Names of those present at inspection: None			
Checklist	Yes	No	Explanation
Site Security			
a) Was fencing, gates and signs in good condition?	√		
b) Were gates locked?		√	Chained shut with no lock, within locked MNTP grounds
c) Evidence of trespassing		√	
Landfill Cover			
d) Evidence of Settling and/or Ponding?		√	
e) Any desiccation or cracking detected?		√	
f) Erosion around cap?		√	
g) Animal burrowing detected?		√	
Vegetation Condition			
h) Is vegetation well established?	√		
i) Evidence of vegetation detrimental to cap?	√		Some woody vegetation present in rip rap
Landfill structures			
j) Evidence of damage to monitoring wells?		√	
k) Evidence of damage to gas vents?		√	
Field Conclusions			
l) Is there an imminent hazard to the integrity of the unit?		√	
m) Are repairs necessary?	√		Woody vegetation to be removed
Certification			
Inspector Signature: R Jeff Ramsby		Printed Name: Jeff Ramsby	
Title: Lead Supervising Hydrogeologist		Date: November 18, 2014	

Landfill M13

JOAAP LANDFILL INSPECTION CHECKLIST			
Landfill Designation: M13		Date of Inspection: November 18, 2014	
Inspected By: Jeff Ramsby, MWH Americas, Inc.		Weather Conditions: Pt. cloudy, windy, 17 deg.	
Names of those present at inspection: None			

Checklist	Yes	No	Explanation
Site Security			
a. Was fencing, gates and signs in good condition?	√		
b. Were gates locked?	√		
c. Evidence of trespassing		√	
Landfill Cover			
d. Evidence of Settling and/or Ponding?		√	
e. Any desiccation or cracking detected?		√	
f. Erosion around cap?		√	
g. Animal burrowing detected?		√	
Vegetation Condition			
h. Is vegetation well established?	√		
i. Evidence of vegetation detrimental to cap?	√		Some woody vegetation present in rip rap
Landfill structures			
j. Evidence of damage to monitoring wells?		√	
k. Evidence of damage to gas vents?		√	
Field Conclusions			
l. Is there an imminent hazard to the integrity of the unit?		√	
m. Are repairs necessary?	√		Woody vegetation to be removed

Certification	
Inspector Signature:	Printed Name: Jeff Ramsby
Title: Lead Supervising Hydrogeologist	Date: November 18, 2014

Appendix B
Inspection Photographs

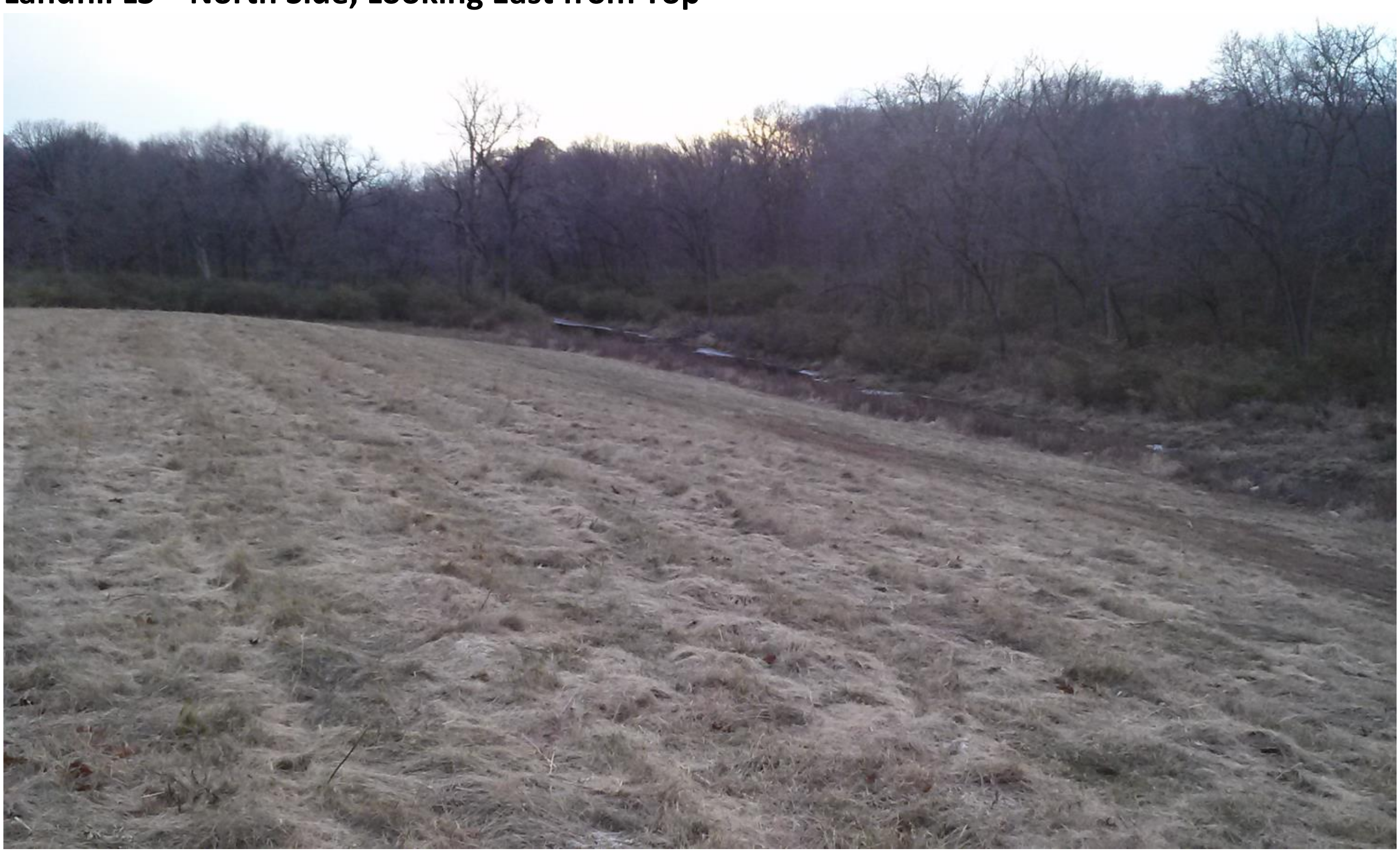

Landfill L3 – East End, Looking Southwest from Bridge


Landfill L3 – North Side, Looking West from Bridge


Landfill L3 – North Side, East Half, Looking East

Landfill L3 – North Side, West Half, Looking West

Landfill L3 – North Side, Looking East from Top



Landfill L3 – North Side, Looking West from Top


Landfill L3 – South Side, East Half


Landfill L3 – South Side, West Half

Landfill L3 – Top, East Half

Landfill L3 – Top, West Half

Landfill L3 – West End, North Side

Landfill L3 – West End, South Side

Landfill M11 – South End, East Side

Landfill M11 – South End, West Side

Landfill M11 – East Side, North Half, Looking North

Landfill M11 – Top, Looking North

Landfill M11 – Top, North Half, Looking North

Landfill M11 – West Side, Center, Looking Toward Top to East


Landfill M11 – West Side, North Half, Looking North

Landfill M11 – West Side, South Half, Looking South

Landfill M13 – East Side, Looking North

Landfill M13 – North Side, Looking East

Landfill M13 – South Side, Looking West

Landfill M13 – West Side, Looking South

Landfill M13 – Top, from Center, Looking East

Landfill M13 – Top, from Center, Looking North

Landfill M13 – Top, from Center, Looking South

Landfill M123 – Top, from Center, Looking West

A2 - POST-CLOSURE LANDFILL INSPECTION REPORT FOURTH QUARTER (DECEMBER) 2014

Former Joliet Army Ammunition Plant
Will County, Illinois

Post-closure Landfill Inspection Report
Fourth Quarter (December) 2014

Long-Term Monitoring for Multiple Groundwater Sites

Prepared For:
U.S. Army Environmental Command

Firm Fixed Price Contract
W9124J-14-P-0142

December 2014

MWH

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A Post-closure Inspection Checklists

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ACRONYMS AND ABBREVIATIONS

COC	contaminants of concern
GMZ	Groundwater Management Zone
IAC	Illinois Administrative Code
JOAAP	former Joliet Army Ammunition Plant
LAP	Load-Assemble-Package Area
LTM Plan	Final Long-term Monitoring Plan for Environmental Remediation Services (TolTest/MWH, March 2010)
MFG	Manufacturing Area
MWH	MWH Americas, Inc.
PWS	Performance Work Statement
RA	remedial action
Report	Post-closure Landfill Inspection Report, Fourth Quarter (December) 2014
TolTest	TolTest, Inc.
USAEC	United States Army Environmental Command

1.0 INTRODUCTION

MWH Americas, Inc. (MWH) has been retained by the United States Army Environmental Command (USAEC) to conduct environmental remediation services at the former Joliet Army Ammunition Plant (JOAAP), Will County, Illinois. Work was executed under firm fixed-price contract number W9124J-14-P-0142. MWH performed tasks in accordance with the Performance Work Statement (PWS) dated 27 August 2014 which includes quarterly inspection of the condition of Landfills L3, M11, and M13 located at JOAAP. This Post-closure Landfill Inspection Report, Fourth Quarter (December) 2014 (Report) documents the conditions identified during the inspection of the landfills conducted in December 2014.

Post-closure monitoring requirements for Landfills L3, L11, and M13 are mandated by Illinois Administrative Code (IAC) Title 5, Subtitle G, Chapter 1, Subchapter c, Part 724, Subpart G for 15 years at Landfill M13 and 30 years at Landfills L3 and M11.

According to the *Final Long-term Monitoring Plan for Environmental Remediation Services* (LTM Plan [TolTest/MWH, March 2010]):

- Section 4.2.1.3.2, *"According to IAC, the Landfill L3 cover will be inspected on a quarterly basis…"*
- Section 4.2.2.3.2, *"According to IAC, the Landfill M11 cover will be inspected quarterly for the first five years and then annually for 25 years."*
- Section 4.2.3.2, *"Long-term monitoring of the landfill cap (M13) will include quarterly inspections of the cap, …"*

Landfill inspections have been conducted on a quarterly basis at Landfills L3, M11, and M13 from October 2008 through July 2013 in accordance with the LTM Plan. Inspection of Landfills L3, M11, and M13 were conducted by TolTest, Inc. (TolTest) in October 2013. However, the Post-closure Inspection Report was not received from TolTest prior to their bankruptcy. Additionally, TolTest did not conduct landfill inspections in January 2014 prior to their bankruptcy. Landfill inspections were conducted by MWH in October, November, and December 2014. The Post-closure Landfill Inspection Report for October is included in the Draft *2014 Semi-annual Groundwater Monitoring Report* (MWH, January 2015).

The October 2013 landfill inspection at M11 would have completed the first five years of quarterly inspections (October 2008 through October 2013). According to Sections 4.2.2.2 and 4.2.2.3.2 of the LTM Plan, Landfill M11 is required to have quarterly inspections completed for the first five years, and annually thereafter. As stated in the Draft Final *2013 Annual Groundwater Monitoring Report* (MWH, January 2015) currently in review, *"Quarterly inspections of the landfill cap at Site M11 were required for the first five years, then annually thereafter. However, due to the missing inspections report from October 2013, when the landfill was mowed for the first time, quarterly inspections will continue through 2014."* In accordance with the LTM Plan, this will be the final quarterly inspection conducted at Landfill M11.

Inspection objectives include:

- Confirm that the landfill cap has controlled leaching so that water quality will not be threatened in the future.
- Ensure that the cap is maintained in a manner that will not increase infiltration in the future or otherwise allow waste to be exposed.
- Keep survey points protected and visible to facilitate identification in the future.
- At M13 ensure the fence and signage installed to restrict site access remain in place and serviceable.
- At M13 certify that institutional controls remain in place.

According to IAC and the LTM Plan, Landfills L3, M11, and M13 covers will be inspected on a quarterly basis for:

- Depressions indicating subsidence or other deformations that could breach the cover.
- Erosion features.
- Growth of deep rooted vegetation or invasive species that would adversely affect evapotranspiration and/or erosion armoring.
- Debris or blockage of drainage structure.

Any damages or changes noted will be repaired to comply with the final design specifications for the cover.

In addition, land use restrictions have been imposed across the area within the fence. Annual certification is required to document that none of the following are occurring within the fence:

- Development
- Intrusive work
- Excavation that could mobilize contaminants of concern (COC)
- Alteration of surface water flow
- Vehicle use other than that associated with maintenance of the cover/cap.

2.0 LANDFILL DESCRIPTIONS

2.1 LANDFILL L3

Site L3 comprises approximately 50 acres used as a demolition area located in the Load-Assemble-Package Area (LAP) located on the east side of Highway 53. Site L3 is bounded on the west by Prairie Creek, the south by an unnamed tributary of Prairie Creek, and the east by Star Grove Cemetery. Predominant use of the area was for open burning of combustibles and munitions crates, including some materials with low level explosive contamination. An air curtain destructor was constructed at the site to reduce emissions, but was never put into use. There was also a one-acre fire training area at the site, which consisted of a small depression surrounded by an earthen berm. Specific burning units included "U" and "L" shaped burn pads and a burn cage on a concrete slab. The remedial action (RA) selected for the Site L3 was consolidation and capping into what is now called Landfill L3. Implementation of the remedy began in 2007 and was completed in 2008.

Landfill L3 occupies approximately 3.3 acres of the Site L3 area. Landfill L3 is located on the western edge of the Site L3 Groundwater Management Zone (GMZ) on the east bank of Prairie Creek. The current conceptual site model is that Landfill L3 is believed to contain metals and explosive residues that could continue to contaminate the underlying groundwater and migrate to Prairie Creek. With the implementation of the RA at Site L3, it is anticipated that the landfill cap will prevent percolation of precipitation through waste consolidated in the landfill. Because the landfill is bordered by Prairie Creek, any contamination that infiltrates from the filled area would be expected to migrate to Prairie Creek and discharge as the groundwater flows upward into the surface water body.

2.1.1 Monitoring Locations

Both groundwater and surface water sample points are monitored at Landfill L3 during the 2nd and 4th quarterly sampling events in 2014 as follows:

- Upgradient Locations
  - SW004 (Surface location where Prairie Creek first enters the L3 GMZ boundary and upstream of the storm water outfall, 2nd quarter only).
- Downgradient Locations
  - MW410
  - MW412
  - MW630
  - MW631
  - MW633
  - SW777 (Surface water location in Prairie Creek near the L3 GMZ boundary)

- SW557 (Surface water location in Prairie Creek just upstream of the landfill drainage swale discharge)
- SW558 (Surface water location at the constructed drainage swale along the southwest side of the landfill)

2.2 LANDFILL M11

Site M11 comprises approximately 133 acres and is located in the southwestern portion of the Manufacturing Area (MFG) located on the west side of Highway 53. Site M11 was divided into two sections by School House Road and bordered on the west by West Patrol Road. M11 north encompassed approximately 10.5 acres of former gravel pits that were mined and filled with waste. M11 south, a former gravel pit, encompassed approximately 5.6 acres that was also mined and filled with waste. The remedy selected for Site M11 was waste consolidation and capping into what is now called Landfill M11. Implementation of the remedy began in 2006 and was completed in 2008.

Landfill M11 occupies approximately 10.5 acres of the Site M11 north area. There is no GMZ associated with Landfill M11. The current conceptual site model is that Landfill M11 is believed to contain manganese and sulfate containing waste that could potentially contaminate underlying groundwater. With the implementation of the RA at Site M11, it is anticipated that the landfill cap will prevent percolation of precipitation through waste consolidated in the landfill, thus preventing groundwater contamination.

2.2.1 Monitoring Locations

Groundwater sample points are monitored at Landfill M11 during the 4th quarterly sampling event in 2014 as follows:

- Upgradient Locations
  - MW802
  - MW803
- Downgradient Locations
  - MW333
  - MW334
  - MW335
  - MW336
  - MW804
  - MW805

2.3 LANDFILL M13

Site M13 comprises approximately 106 acres of the central part of the MFG area formerly known as the gravel pits. It lies north of the Tetryl Production Area, east of the TNT Ditch Complex, and west of the Acid Area. Disposal activities were confined to four discrete areas of the site, none of which extended beyond 12 acres in size. Historical records indicate landfilling took place in the Northern Gravel Pit during the period 1966 to 1984 and involved scrap metals, creosote-treated railroad ties, telephone poles, and construction/demolition debris. The three other pits received waste materials that do not appear to pose a threat to human health and the environment. The RA selected for the Site M13 was consolidation and capping into what is now called Landfill M13. Implementation of the remedy began in 2007 and was completed in 2008.

Landfill M13 comprises approximately 10.2 acres and is located in the northern part of Site M13 and within the MFG GMZ. The current conceptual site model is that metals and benzo(a)pyrene in groundwater may be present as a result of leaching of waste materials in the Northern Gravel Pit. The explosives present in groundwater are far more likely to be present due to infiltration of wastewater in the TNT Ditch. There is no evidence to suggest explosive compounds were ever present in waste materials put into the pit. With the implementation of the RA at Site M13, it is anticipated that the landfill cap will prevent percolation of precipitation through waste consolidated in the landfill and it is anticipated that contaminants in site groundwater will detach from the source areas and migrate as legacy plumes to the west. As such, concentrations are expected to decline with time.

2.3.1 Monitoring Locations

Groundwater is monitored quarterly through sample collection and analysis at seven monitoring wells:

- Upgradient or background wells
  - MW806
  - MW807
- Downgradient or source control wells
  - MW126R
  - MW362
  - MW808
  - MW809
  - MW811 (installed October 2014)

3.0 INSPECTION RESULTS

Landfill inspections were conducted on 18 December 2014 for Landfills L3, M11, and M13. This report includes copies of the inspection checklist, photographs, and recommendations. The Post-closure Inspection Checklists are found in Appendix A, and Inspection Photographs are found in Appendix B.

3.1 LANDFILL L3

The cap for Landfill L3 was mowed in December 2014. The vegetative cover was well established. Mowing was conducted in the opposite direction as was completed in October 2014 to provide a better cut for vegetation that was “laid-down” by the mower in October. The vegetation was cut between approximately 4 to 6 inches in height.

The perimeter fence and site postings were in good condition.

The rip rap along Prairie Creek at Landfill L3 has been washed away at several locations and is in need of repair. Although small areas of the synthetic cap at L3 are exposed due to displacement of the rip rap, the liner is only visible in the sloped, rip rap area, not over the cap of the landfill. Although small areas of the synthetic cap are exposed at several locations as a result of the rip rap being washed away, the slope of the landfill line appears to be stable and no visual indications are present that would suggest a failure of the landfill slope. The remaining rip rap also appears to be stable.

During the inspection there was no indication of the following:

- Depressions indicating subsidence or other deformations that could breach the cover.
- Erosion features.
- Debris or blockage of drainage structure.

During the inspection there was no indication of the following activities:

- Development
- Intrusive work
- Excavation that could mobilize COCs
- Alteration of surface water flow
- Vehicle use other than that associated with maintenance of the cover/cap.

3.2 LANDFILL M11

The cap for Landfill M11 was mowed in December 2014. The vegetative cover was well established. Mowing was conducted in the opposite direction as was completed in October 2014 to provide a better cut for vegetation that was "laid-down" by the mower in October. The vegetation was cut between approximately 4 to 6 inches in height. Additionally, small trees and woody vegetation in the rip rap along the perimeter of the landfill was removed.

The perimeter fence and site postings were in good condition. The rip rap along the perimeter was evenly applied. The vents were undamaged and appeared to be in working order.

During the inspection there was no indication of the following:

- Depressions indicating subsidence or other deformations that could breach the cover.
- Erosion features.
- Debris or blockage of drainage structure.

During the inspection there was no indication of the following activities:

- Development
- Intrusive work
- Excavation that could mobilize COCs
- Alteration of surface water flow
- Vehicle use other than that associated with maintenance of the cover/cap.

3.3 LANDFILL M13

The cap for Landfill M13 was mowed December 2014. The vegetative cover was well established. Mowing was conducted in the opposite direction as was completed in October 2014 to provide a better cut for vegetation that was "laid-down" by the mower in October. The vegetation was cut between approximately 4 to 6 inches in height. Additionally, small trees and woody vegetation in the rip rap along the perimeter of the landfill was removed. The area between the Landfill M13 fence and the rip rap surrounding the landfill cap is becoming quite overgrown with grasses, shrubs, and small trees.

The perimeter fence and site postings were in good condition. The rip rap along the perimeter was evenly applied. The vents were undamaged and appeared to be in working order.

During the inspection there was no indication of the following:

- Depressions indicating subsidence or other deformations that could breach the cover.
- Erosion features.

A drainage ditch located on the south side of the landfill periodically has standing water due to poor drainage. The ditch is filling with plants and sediments.

During the inspection there was no indication of the following activities:

- Development
- Intrusive work
- Excavation that could mobilize COCs
- Alteration of surface water flow (see above)
- Vehicle use other than that associated with maintenance of the cover/cap

4.0 RECOMMENDATIONS

The deficiencies noted within this Report which need to be addressed include the following:

Landfill L3:

- Repair rip rap along Prairie creek. The Army is currently preparing the contract documentation necessary for implementation of the repairs. Field work is currently scheduled to begin in August 2015.
- Scattered woody plants observed on the landfill cap should be spot treated using 2,4-D once the growing season resumes.
- Mowing should be conducted in spring and fall 2015.

Landfill M11:

- Inspections at Landfill M11 will be reduced to annual only (Fourth Quarter) in accordance with the LTM Plan. However, maintenance activities such as mowing will continue to be conducted on the same schedule as Landfills L3 and M13.
- Scattered woody plants observed on the landfill cap should be spot treated using 2,4-D once the growing season resumes.
- Mowing should be conducted in spring and fall 2015.

Landfill M13:

- Scattered woody plants observed on the landfill cap should be spot treated using 2,4-D once the growing season resumes.
- Although the landfill cap was mowed, the overgrowth within the Landfill M13 fenced area and surrounding the perimeter rip rap is limiting access to the landfill. Additionally, having such a dense overgrowth of seed sources in close proximity to the landfill, there will continue to be a high occurrence of invading species. Therefore, additional mowing should be conducted surrounding the landfill, including the drainage ditch located on the south side of the landfill.
- Following the fence-to-fence mowing, the drainage ditch on the south side of the landfill should be inspected. Some aerial photographs indicate the area may actually be intended for retention of surface water. If not, the drainage may need to be modified to eliminate the retention of surface water.

Appendix A
Post-Closure Inspection Checklists

Landfill L3

JOAAP LANDFILL INSPECTION CHECKLIST			
Landfill Designation: L3		Date of Inspection: December 18, 2014	
Inspected By: Jeff Ramsby, MWH Americas, Inc.		Weather Conditions: 34 degrees, cloudy	
Names of those present at inspection: None			

Checklist	Yes	No	Explanation
Site Security			
a) Was fencing, gates and signs in good condition?	√		
b) Were gates locked?	√		
c) Evidence of trespassing		√	
Landfill Cover			
d) Evidence of Settling and/or Ponding?		√	
e) Any desiccation or cracking detected?		√	
f) Erosion around cap?		√	
g) Animal Burrowing detected?		√	
Vegetation Condition			
h) Is vegetation well established?	√		
i) Evidence of vegetation detrimental to cap?	√		Woody vegetation removed from rip rap, future spraying may be needed.
Landfill structures			
j) Evidence of damage to monitoring wells?		√	
k) Evidence of damage to gas vents?		NA	No vents
Field Conclusions			
l) Is there an imminent hazard to the integrity of the unit?		√	
m) Are repairs necessary?	√		Rip Rap along creek needs repair.

Certification	
Inspector Signature: Jeff Ramsby	Printed Name: Jeff Ramsby
Title: Lead Supervising Hydrogeologist	Date: December 18, 2014

Landfill M11

JOAAP LANDFILL INSPECTION CHECKLIST

Landfill Designation: M11	Date of Inspection: December 18, 2014
Inspected By: Jeff Ramsby, MWH Americas, Inc.	Weather Conditions: 34 degrees, cloudy
Names of those present at inspection: None	

Checklist	Yes	No	Explanation
Site Security			
a) Was fencing, gates and signs in good condition?	√		
b) Were gates locked?		√	Chained shut with no lock, lock needs to be added.
c) Evidence of trespassing		√	
Landfill Cover			
d) Evidence of Settling and/or Ponding?		√	
e) Any desiccation or cracking detected?		√	
f) Erosion around cap?		√	
g) Animal burrowing detected?		√	
Vegetation Condition			
h) Is vegetation well established?	√		
i) Evidence of vegetation detrimental to cap?	√		Woody vegetation removed from rip rap, future spraying may be needed.
Landfill structures			
j) Evidence of damage to monitoring wells?		√	
k) Evidence of damage to gas vents?		√	
Field Conclusions			
l) Is there an imminent hazard to the integrity of the unit?		√	
m) Are repairs necessary?		√	

Certification

Inspector Signature: R Jeff Ramsby	Printed Name: Jeff Ramsby
Title: Lead Supervising Hydrogeologist	Date: December 18, 2014

Landfill M13

JOAAP LANDFILL INSPECTION CHECKLIST			
Landfill Designation: M13		Date of Inspection: December 18, 2014	
Inspected By: Jeff Ramsby, MWH Americas, Inc.		Weather Conditions: 34 degrees, cloudy	
Names of those present at inspection: None			

Checklist	Yes	No	Explanation
Site Security			
a. Was fencing, gates and signs in good condition?	√		
b. Were gates locked?	√		
c. Evidence of trespassing		√	
Landfill Cover			
d. Evidence of Settling and/or Ponding?		√	
e. Any desiccation or cracking detected?		√	
f. Erosion around cap?		√	
g. Animal burrowing detected?		√	
Vegetation Condition			
h. Is vegetation well established?	√		
i. Evidence of vegetation detrimental to cap?	√		Woody vegetation removed from rip rap, future spraying may be needed.
Landfill structures			
j. Evidence of damage to monitoring wells?		√	
k. Evidence of damage to gas vents?		√	
Field Conclusions			
l. Is there an imminent hazard to the integrity of the unit?		√	
m. Are repairs necessary?		√	

Certification	
Inspector Signature:	Printed Name: Jeff Ramsby
Title: Lead Supervising Hydrogeologist	Date: December 18, 2014

Appendix B
Inspection Photographs

Landfill L3 – East End from Bridge

Landfill L3 – North Side from Bridge

Landfill L3 – North Side, East Half from Top

Landfill L3 – North Side, West Half from Top

Landfill L3 – South Side, East Half

Landfill L3 – South Side, West Half


Landfill L3 – Top, East Half

Landfill L3 – Top, West Half

Landfill L3 – West End, North Side

Landfill L3 – West End, South Side

Landfill L3 – Woody Vegetation Cut from South Side Rip Rap

Landfill M11 – East Side, Looking North

Landfill M11 – East Side, Looking North-Northwest

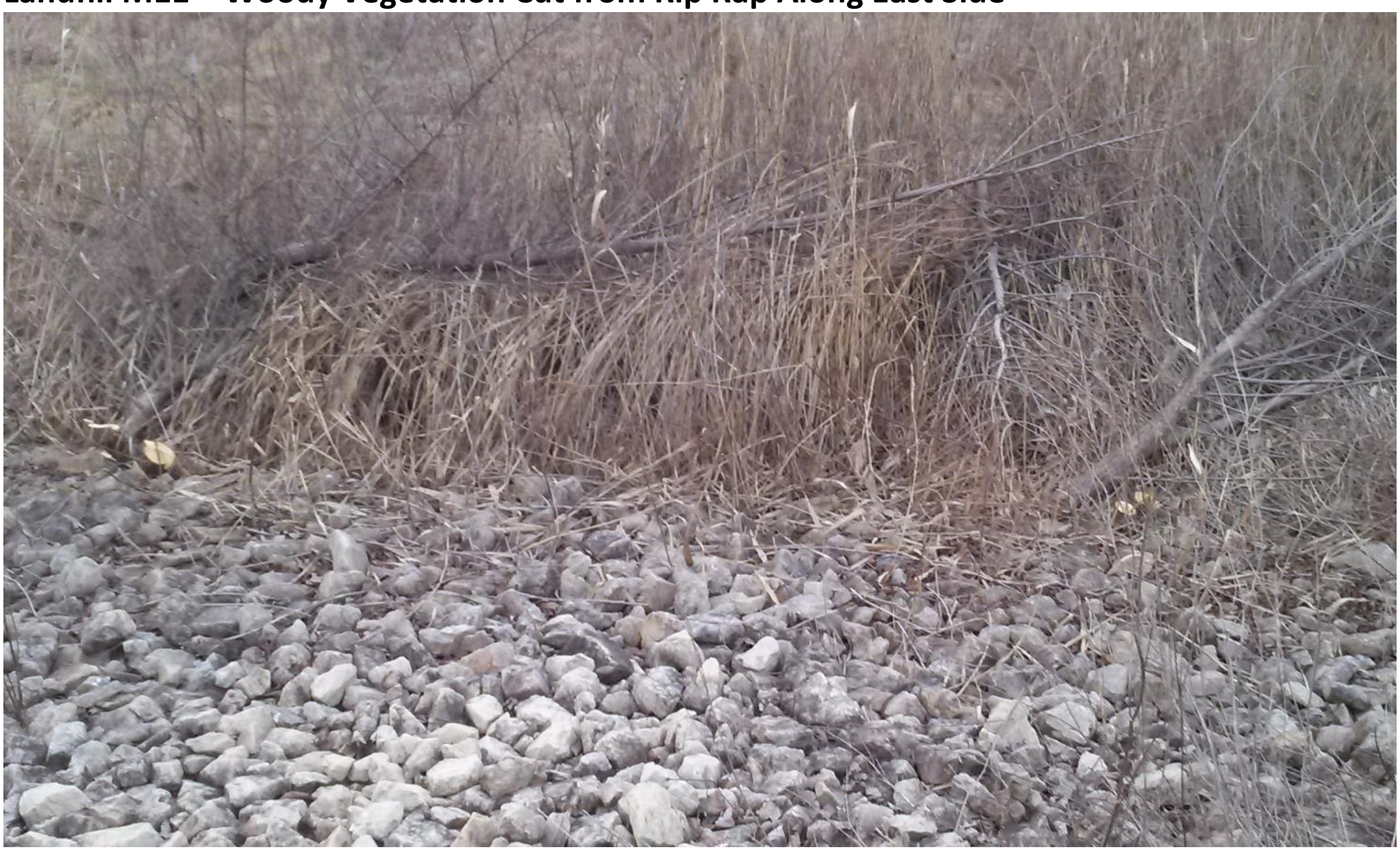
Landfill M11 – Top, Looking South from North End

Landfill M11 – Top, South Half, Looking South

Landfill M11 – West Side, North Half

Landfill M11 – West Side, South Half

Landfill M11 – Woody Vegetation Cut from Rip Rap Along East Side



Landfill M11 – Small Trees Removed from Rip Rap Along East Side


Landfill M11 –Rip Rap Cleared of Woody Vegetation, East Side, South End


Landfill M13 – East Side, Looking South


Landfill M13 – North Side, Looking East

Landfill M13 – West Side, Looking South

Landfill M13 – South Side, Looking West


Landfill M13 – Southwest Side, Looking West

Landfill M13 – Northwest Corner, Looking Southeast


Landfill M13 – Southeast Corner, Looking Northwest

Landfill M13 – Small Trees Removed from Rip Rap Along North Side

Landfill M13 – Small Trees Removed from Rip Rap Along North Side

APPENDIX B

HISTORICAL DATA TABLES

B1 - Summary of Historical Groundwater Results – Explosives
B2 - Summary of Historical Groundwater Results – Metals
B3 - Summary of Historical Groundwater Results – Indicator Parameters
B4 - Summary of Historical Groundwater Results – Volatile Organic Compounds
B5 - Summary of Historical Groundwater Results – Semi-Volatile Organic Compounds

B1 - SUMMARY OF HISTORICAL GROUNDWATER RESULTS – EXPLOSIVES

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**1,3-DNB**		**2,4-DNT**		**2,6-DNT**		**2-A-4,6-DNT**		**4-A-2,6-DNT**		**HMX**		**NB**		**2-NT**		**3-NT**		**4-NT**		**RDX**		**Tetryl**		**1,3,5-TNB**		**2,4,6-TNT**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[1]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
L1	***In-Plume***																													
		10/25/2005	<3.9		<3.9		**9.6**		48		33		<7.8		<3.9		<7.8		<7.8		<7.8		<3.9		<7.8		**1800**		**1300**	
		5/5/2006	<3.9		<3.9		<7.8		75		62		<7.8		<3.9		<7.8		<7.8		<7.8		<3.9		<7.8		**3200**		**4400**	
		10/19/2006	<3.9		<3.9		<7.8		29		26		<7.8		<3.9		<7.8		<7.8		<7.8		<3.9		<7.8		**180**		**150**	
		5/1/2007	<44		<44		<88		<88		<88		<88		<44		<88		<88		<88		<44		<88		**4200**		**9900**	
		5/1/2007 (DUP)	<50		<50		<100		<100		<100		<100		<50		<100		<100		<100		<50		<100		**4500**		**10000**	
		10/16/2007	<39		<39		<78		<78		<78		<78		<39		<78		<78		<78		<39		<78		**1700**		**1100**	
		5/14/2008	<4.5		<4.5		<9		100		63		<9		<4.5		<9		<9		<9		<4.5		<9		**3100**		**4900**	
		10/28/2008	<3.9		<3.9		<7.8		27		30		<7.8		<3.9		<7.8		<7.8		<7.8		<3.9		<7.8		**1100**		**870**	
		5/1/2009	<1.6		<3.1		<3.1		21		36		<3.1		<1.6		<3.1		<3.1		<3.1		<1.6		<3.9		**460**		**1400**	
	MW131	10/27/2009	<4.1		<7.9		<7.9		89		110		<7.9		17		<7.9		<7.9		<7.9		<4.1		<9.9		**4000**		**11000**	
		4/12/2010	<4.0		<7.8		<7.8		55		66		<7.8		<4.0		<7.8		<7.8		<7.8		<4.0		<9.8		**3200**		**4100**	
		10/27/2010	0.49	/ J	<0.54		**6.8**	/ J	40		37		<0.54		<0.28		1.3	/ J	<0.54		<0.54		<0.28		<0.68		**1700**		**1000**	
		4/15/2011	<30		<57		<57		54	F /	91		<57		<30		<57		<57		<57		<30		<72		**3400**		**5800**	
		10/11/2011	<1.9		<1.9		<1.9		40		57	/ J	6		<1.9		<3.7		<3.7		<3.7		1.3	F /	<4.6		<1.9		**1100**	
		4/12/2012	5.4	/ J	<3.1		<3.1		65		70		<3.1		<1.6		<3.1		<3.1		<3.1		<1.6		<3.9		<1.6		**2200**	
		10/29/2012	<16		<31		<31		<31		35		<31		<16		<31		<31		<31		<16		<39		<16		**1000**	
		4/13/2013	<0.37	U / UJ	<0.37	U / UJ	<0.18	U / UJ	40	/ J	55	/ J	<0.37	U / UJ	<0.37	U / UJ	<0.37	U / UJ	<0.37	U / UJ	<0.92	U / UJ	<0.18	U / UJ	<0.22	U / UJ	**3100**	/ J	**4200**	/ J
		10/19/2013	<0.43	U / UJ	<0.32	U / UJ	<0.21	U / UJ	24	/ J	<43		<86		6.2	/ J	<0.43	U / UJ	<0.43	U / UJ	<1.1	U / UJ	<43		<0.26	U / UJ	**1400**		**860**	
		10/28/2014	<0.38		<0.38		<0.19		58	/ J	<0.19		<0.38		<0.38		160	/ J	<0.38		<0.95		<0.19		2.2	/ J	**910**	/ J	**1100**	/ J
		12/9/2014	<83		<0.42	U / UJ	<42		11	/ J	<0.21	U / UJ	<83		<83		<83		<83		<210		<42		<50		**2000**		**1500**	
		10/25/2005	<0.4		**0.43**		<0.79		6.4		6.9		1.8		<0.4		<0.79		<0.79		<0.79		**13**		<0.79		2.2		**18**	
		5/5/2006	<0.46		<0.46		<0.91		4.6		5		1.4		<0.46		<0.91		2.8		<0.91		**11**		<0.91		2.5		**15**	
		10/19/2006	<0.57		<0.57		<1.1		5.5		6.4		<1.1		<0.57		<1.1		<1.1		<1.1		**11**		<1.1		<0.57		**9.6**	
		5/1/2007	<0.39		<0.39		<0.78		5.6		5.9		2.3		<0.39		<0.78		<0.78		<0.78		**15**		<0.78		3		**33**	
		10/16/2007	<0.39		<0.39		<0.78		5		7.2		1.6		<0.39		<0.78		<0.78		<0.78		**11**		<0.78		<0.39		7.2	
		5/14/2008	<0.39		<0.39		<0.78		4.3		4.7		1.1		<0.39		<0.78		<0.78		<0.78		**9.3**		<0.78		1.4		**14**	
		10/27/2008	<0.39		<0.39		<0.78		5		5.5		1.1		<0.39		<0.78		<0.78		<0.78		**9.5**		<0.78		1.5		**15**	
		5/1/2009	<0.17		<0.32		<0.32		4.4		5.1		1.3		<0.17		<0.32		<0.32		<0.32		**12**		<0.4		2.6		**20**	
		10/27/2009	<0.22		<0.43		<0.43		1.8		3.7		1.6	/ J	<0.22		<0.43		<0.43		0.19	F /	**9.6**		<0.54		<0.22		1.7	
		4/13/2010	<0.17		<0.32		<0.32		4.1		4.8		1.2		<0.17		<0.32		<0.32		<0.32		**8.6**		<0.40		0.94		**10**	
	MW173	10/27/2010	<0.20		<0.38		<0.38		0.84		1		<0.38		<0.20		<0.38		<0.38		<0.38		**3.4**		<0.48		<0.20		0.95	
		4/14/2011	<0.31		<0.6		<0.6		4.7		5.9		1.3		<0.31		<0.6		<0.6		<0.6		**9.6**		<0.76		0.63		**10**	
		10/11/2011	<0.33		<0.33		<0.33		3.4	/ J	2.2	/ J	1.4		<0.33		<0.65		<0.65		<0.65		**10**		<0.81		<0.33		8.2	/ J
		4/11/2012	<0.16		<0.31		<0.31		4.8		5.4		1.4	/ J	<0.16		<0.31		<0.31		<0.31		**10**		<0.39		<0.16		**12**	
		10/29/2012	<0.8		<1.6		<1.6		<1.6	U / J	<1.6	U / J	<1.6		<0.8	U / J	<1.6		<1.6	U / J	<1.6	U / J	<0.8	U / J	<2	U / J	<0.8		<0.8	U / J
		10/29/2012 (DUP)	<0.8		<1.6		<1.6		4.3		4.3		<1.6		<0.8		<1.6		<1.6		<1.6		**6.2**	/ J	<2		<0.8		2.8	
		4/13/2013	<0.37		<0.37		<0.18		1.3		1	/ J	0.22	F / J	<0.37		<0.37		<0.37		<0.92		1.6	/ J	<0.22		<0.92		0.56	
		10/19/2013	<0.43		<0.32		<0.22		4.5		5.3		0.79		<0.43		<0.43		<0.43		<1.1		**7.2**		<0.26		0.9	F /	**9.7**	
		10/27/2014	<0.39		<0.39		<0.19		4.3		5.9		1.5	/ J	<0.39		<0.39		<0.39		<0.96		**9**		<0.23	U / UJ	<0.96		6.2	
		12/9/2014	<0.41		<0.41		<0.2		2.2	/ J	2.7		0.67		<0.41		<0.41		<0.41		<1		**4.4**		<0.25		<1		4.3	
		10/25/2005	<0.39		<0.39		<0.78		2.7		2.9		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		2		2.6	
		5/5/2006	<0.39		<0.39		<0.78		8		8.3		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		**14**		**14**	
		10/19/2006	<0.39		<0.39		<0.78		4		4.8		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		4.5		3.7	
		5/1/2007	<3.9		<3.9		<7.8		16		22		<7.8		<3.9		<7.8		<7.8		<7.8		<3.9		<7.8		**71**		**67**	
		10/16/2007	<5.9		<5.9		<12		16		20		<12		<5.9		<12		<12		<12		<5.9		<12		**20**		**35**	
		5/14/2008	<3.9		<3.9		<7.8		12		17		<7.8		<3.9		<7.8		<7.8		<7.8		<3.9		<7.8		**34**		**40**	
		10/28/2008	<0.39		<0.39		<0.78		11		15		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		**8.2**		**17**	
		10/28/2008 (DUP)	<0.53		<0.53		<1.1		11		15		<1.1		<0.53		<1.1		<1.1		<1.1		<0.53		<1.1		**8.5**		**19**	
		10/27/2009	<0.22		<0.43		<0.43		2.1		3.4		<0.43		<0.22		<0.43		<0.43		<0.43		0.36		<0.54		0.78		1.7	
		4/12/2010	<0.17		<0.32		<0.32		4.2		6.4		<0.32		<0.17		<0.32		<0.32		<0.32		<0.17		<0.40		3.7		7.4	
	WES1	10/27/2010	0.096	F /	**1.6**		<0.31		15		18		<0.31		<0.16		<0.31		<0.31		<0.31		0.73		<0.39		**21**		**34**	
		10/27/2010 (DUP)	<0.21		**1.8**		<0.41		17		20		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.51		**23**		**38**	
		4/15/2011	<0.29		<0.56		<0.56		14		26		<0.56		<0.29		<0.56		<0.56		<0.56		<0.29		<0.71		**39**		**48**	
		10/11/2011	<0.25		<0.25		<0.25		11		15		<0.49		<0.25		<0.49		<0.49		<0.49		0.26		<0.61		<0.25		**31**	/ J
		4/12/2012	<1.6		<3.1		<3.1		13		21	/ J	<3.1		3.9		<3.1		<3.1		<3.1		<1.6		<3.9		**40**	/ J	**38**	
		10/29/2012	<0.8		<1.6		<1.6		8.1	/ J	9.1		<1.6		<0.8		<1.6		<1.6		<1.6		<0.8		<2		<0.8		6.4	
		4/13/2013	<0.4	U / UJ	<0.4	U / UJ	0.29	/ JJ	10	/ J	12	/ J	<0.4	U / UJ	0.11	F / JJ	<0.4	U / UJ	<0.4	U / UJ	<1	U / UJ	<0.2	U / UJ	<0.24	U / UJ	**16**	F / J	**25**	/ J
		10/19/2013	<0.43	U / UJ	**1.3**	/ J	<0.21		15	/ J	16	/ J	<0.43	U / UJ	<0.43	U / UJ	<0.43		<0.43	U / UJ	<1.1		<0.21		<0.26		<1.1	U / UJ	**16**	/ J
		10/28/2014	<0.37		<0.37		<0.19		5.9	/ J	6.9	/ J	<0.37		<0.37		0.23	F / J	<0.37		<0.93		<0.19		<0.22	U / UJ	**16**	/ J	**14**	/ J
		12/9/2014	<0.39		<0.39		<0.2		2.3	/ J	2.7		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24		0.27	F / J	1.1	

TABLE B1

Summary of Analytical Results - Explosives
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Joliet Army Ammunition Plant
Will County, Illinois

		Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[1]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
L1	***Early Warning***																													
	MW174	10/25/2005	<0.77		<0.77		<1.5		<1.5		<1.5		<1.5		<0.77		<1.5		<1.5		<1.5		<0.77		<1.5		<0.77		<0.77	
		10/19/2006	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/16/2007	<0.43		<0.43		<0.86		<0.86		<0.86		<0.86		<0.43		<0.86		<0.86		<0.86		<0.43		<0.86		<0.43		<0.43	
		10/27/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/4/2009	<0.17		<0.34		<0.34		<0.34		<0.34		<0.34		<0.17		<0.34		<0.34		<0.34		<0.17		<0.42		<0.17		<0.17	
		10/27/2009	<0.17		<0.33		<0.33		<0.33		<0.33		<0.33		<0.17		<0.33		<0.33		<0.33		<0.17		<0.42		<0.17		<0.17	
		4/12/2010	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/27/2010	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/15/2011	<0.33		<0.63		<0.63		<0.63		<0.63		<0.63		<0.33		<0.63		<0.63		<0.63		<0.33		<0.79		<0.33		0.62	
		10/11/2011	<0.21		<0.21		<0.21		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.52		<0.21		<0.21	
		4/11/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/29/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/13/2013	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
		10/19/2013	<0.42		<0.32		<0.21		<0.21		<0.21		<0.42		<0.42		<0.42		<0.42		<1.1		<0.21		<0.25		<1.1		<0.42	
		10/28/2014	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	
		12/9/2014	<0.37		<0.37		<0.19		<0.19	U / UJ	<0.19		<0.37		<0.37		<0.37		<0.37		<0.94		<0.19		<0.22		<0.94		<0.37	
	WES3	10/25/2005	<0.62		<0.62		<1.2		<1.2		1.4		<1.2		<0.62		<1.2		<1.2		<1.2		0.76		<1.2		0.86		2	
		5/5/2006	<0.39		<0.39		<0.78		<0.78		0.8		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		0.47		0.9	
		10/19/2006	<0.41		<0.41		<0.82		1.2		1.6		<0.82		<0.41		<0.82		<0.82		<0.82		1.9		<0.82		0.43		2.6	
		5/1/2007	<0.39		<0.39		<0.78		<0.78		1		<0.78		<0.39		<0.78		<0.78		<0.78		0.93		<0.78		1		3.2	
		10/16/2007	<0.39		<0.39		<0.78		0.91		1.4		<0.78		<0.39		<0.78		<0.78		<0.78		1		<0.78		<0.39		1.6	
		5/14/2008	<0.39		<0.39		<0.78		<0.78		0.82		<0.78		<0.39		<0.78		<0.78		<0.78		0.61		<0.78		<0.39		1.3	
		10/27/2008	<0.39		<0.39		<0.78		<0.78		0.81		<0.78		<0.39		<0.78		<0.78		<0.78		0.72		<0.78		<0.39		0.44	
		5/4/2009	<0.17		<0.32		<0.32		<0.32		0.89		<0.32		<0.17		<0.32		<0.32		<0.32		0.69		<0.4		<0.17		1.3	
		5/4/2009 (DUP)	<0.18		<0.35		<0.35		<0.35		0.9		<0.35		<0.18		<0.35		<0.35		<0.35		0.7		<0.44		<0.18		1.3	
		10/27/2009	<0.19		<0.37		<0.37		0.59		0.85		0.21	F / J	<0.19		<0.37		<0.37		<0.37		0.34		<0.47		<0.19		0.65	
		4/13/2010	<0.20		<0.39		<0.39		<0.39		<0.39		<0.39		<0.20		<0.39		<0.39		<0.39		0.58		<0.49		<0.20		1.2	
		10/27/2010	<0.19		<0.38		<0.38		0.8		1.1		<0.38		<0.19		<0.38		<0.38		<0.38		0.53		<0.47		0.23		0.99	
		4/15/2011	<0.41		<0.79		<0.79		0.69	F /	1.2		<0.79		<0.41		<0.79		<0.79		<0.79		0.57		<0.99		0.38	F /	2.3	
		10/11/2011	<0.20		<0.20		<0.20		<0.39		<0.39		0.12	F /	<0.20		<0.39		<0.39		<0.39		0.41		<0.49		<0.20		0.9	
		4/11/2012	<0.16		<0.31		<0.31		0.67		1		<0.31		<0.16		<0.31		<0.31		<0.31		0.74		<0.39		0.2		1.2	
		10/29/2012	<0.16		<0.31		<0.31		0.82		0.95		<0.31		<0.16		<0.31		<0.31		<0.31		0.43		<0.39		<0.16		0.76	
		4/13/2013	<0.37	U / UJ	<0.37	U / UJ	<0.18	U / UJ	0.29	/ J	0.3	/ J	<0.37	U / UJ	<0.37	U / UJ	<0.37	U / UJ	<0.37	U / UJ	<0.91	U / UJ	0.11	F / J	<0.22	U / UJ	<0.91	U / UJ	0.23	F / J
		10/19/2013	<0.42		<0.32		<0.21		0.84		0.96		<0.42		<0.42		<0.42		<0.42		<1.1		0.34	/ J	<0.25		<1.1		0.74	
		10/27/2014	<0.37		<0.37		<0.18		0.77		1		<0.37		<0.37		<0.37		<0.37		<0.92		<0.18		<0.22	U / UJ	<0.92		0.95	
		12/9/2014	<0.38		<0.38		<0.19		0.71	/ J	0.89		<0.38		<0.38		<0.38		<0.38		<0.96		0.5		<0.23		<0.96		0.85	
	Compliance																													
	SW550	10/24/2005	<0.48		<0.48		<0.96		<0.96		<0.96		<0.96		<0.48		<0.96		<0.96		<0.96		<0.48		<0.96		<0.48		<0.48	
		5/5/2006	<0.42		<0.42		<0.83		<0.83		<0.83		<0.83		<0.42		<0.83		<0.83		<0.83		<0.42		<0.83		<0.42		<0.42	
		10/17/2006	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		4/27/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		4/27/2007 (DUP)	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/17/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/19/2008	<0.45		<0.45		<0.9		<0.9		<0.9		<0.9		<0.45		<0.9		<0.9		<0.9		<0.45		<0.9		<0.45		<0.45	
		10/23/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/1/2009	<0.16		<0.32		<0.32		<0.32		<0.32		<0.32		<0.16		<0.32		<0.32		<0.32		<0.16		<0.4		<0.16		<0.16	
		10/27/2009	<0.16		<0.32		<0.32		<0.32		<0.32		<0.32		<0.16		<0.32		<0.32		<0.32		<0.16		<0.4		<0.16		<0.16	
		4/14/2010	<0.20		<0.38		<0.38		<0.38		<0.38		<0.38		<0.20		<0.38		<0.38		<0.38		<0.20		<0.48		<0.20		<0.20	
		10/27/2010	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/14/2011	<0.26		<0.5		<0.5		<0.5		<0.5		<0.5		<0.26		<0.5		<0.5		<0.5		<0.26		<0.62		<0.26		<0.26	
		10/11/2011	<0.36		<0.36		<0.36		<0.69		<0.69		<0.69		<0.36		<0.69		<0.69		<0.69		<0.36		<0.87		<0.36		<0.36	
		4/12/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/30/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/14/2013	<0.42		<0.42		<0.21		<0.21		<0.21		<0.42		<0.42		<0.42		<0.42		<1.1		<0.21		<0.25		<1.1		<0.42	
		10/19/2013	<0.43		<0.32		<0.22		<0.22		<0.22		<0.43		<0.43		<0.43		<0.43		<1.1		<0.22		<0.26		<1.1		<0.43	
		10/28/2014	<0.37		<0.37		<0.19		<0.19		<0.19		<0.37		<0.37		<0.37		<0.37		<0.94		<0.19		<0.22	U / UJ	<0.94		<0.37	
		12/9/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23		<0.94		<0.38	

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**1,3-DNB**		**2,4-DNT**		**2,6-DNT**		**2-A-4,6-DNT**		**4-A-2,6-DNT**		**HMX**		**NB**		**2-NT**		**3-NT**		**4-NT**		**RDX**		**Tetryl**		**1,3,5-TNB**		**2,4,6-TNT**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
L2	***In-Plume***																													
	MW404	10/13/2006	<0.64		<0.64		<1.3		<1.3		<1.3		78		<0.64		<1.3		<1.3		<1.3		**270**		<1.3		<0.64		<0.64	
	MW404	4/27/2007	<0.39		<0.39		<0.78		<0.78		<0.78		21		<0.39		<0.78		<0.78		<0.78		**45**		<0.78		<0.39		<0.39	
	MW404	10/17/2007	<0.39		<0.39		<0.78		<0.78		<0.78		52		<0.39		<0.78		<0.78		<0.78		**250**		<0.78		<0.39		<0.39	
	MW404	5/19/2008	<0.39		<0.39		<0.78		<0.78		<0.78		32		<0.39		<0.78		<0.78		<0.78		**110**		<0.78		<0.39		<0.39	
	MW404	10/23/2008	<0.49		<0.49		<0.99		<0.99		<0.99		32		<0.49		<0.99		<0.99		<0.99		**120**		<0.99		<0.49		<0.49	
	MW404	5/1/2009	<0.21		<0.41		<0.41		<0.41		<0.41		11		<0.21		<0.41		<0.41		<0.41		**16**		<0.51		<0.21		<0.21	
	MW404	10/26/2009	<0.3		<0.58		<0.58		<0.58		<0.58		15		<0.3		<0.58		<0.58		<0.58		**27**		<0.73		<0.3		<0.3	
	MW404	4/12/2010	<0.16		<0.31		<0.31		<0.31		<0.31		15		<0.16		<0.31		0.086	F /	<0.31		**27**		<0.39		<0.16		<0.16	
	MW404	10/27/2010	<0.18		<0.35		<0.35		<0.35		<0.35		28		<0.18		<0.35		<0.35		<0.35		**46**		<0.44		<0.18		<0.18	
	MW404	4/14/2011	<0.21		<0.4		<0.4		<0.4		<0.4		24		<0.21		<0.4		<0.4		<0.4		**74**		<0.5		<0.21		<0.21	
	MW404	10/11/2011	<0.22		<0.22		<0.22		<0.42		<0.42		30		<0.22		<0.42		<0.42		<0.42		**94**		<0.53	U / UJ	<0.22	U / UJ	<0.22	U / UJ
	MW404	10/26/2012	<0.16		0.21	F /	<0.31		<0.31		<0.31		33		<0.16		0.54	/ J	<0.31		0.65	/ J	**130**		<0.39		<0.16		<0.16	
	MW404	10/18/2013	<0.42		<0.32		<0.21		<0.21		<0.21		26		<0.42		<0.42		<0.42		<1.1		**84**		<0.25		<1.1		<0.42	
	MW404	12/10/2014	<4.1		<4.1		<2.1		<2.1		<2.1		27		<4.1		<4.1		<4.1		<10		**93**		<2.5		<10		<0.41	
	MW620	10/13/2006	<0.48		<0.48		<0.96		<0.96		<0.96		<0.96		<0.48		<0.96		<0.96		<0.96		<0.48		<0.96		<0.48		<0.48	
	MW620	4/27/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW620	10/17/2007	<0.55		<0.55		<1.1		<1.1		<1.1		<1.1		<0.55		<1.1		<1.1		<1.1		<0.55		<1.1		<0.55		<0.55	
	MW620	5/19/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW620	10/23/2008	<0.45		<0.45		<0.9		<0.9		<0.9		<0.9		<0.45		<0.9		<0.9		<0.9		<0.45		<0.9		<0.45		<0.45	
	MW620	5/1/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	MW620	10/26/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	MW620	4/8/2010	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	MW620	10/27/2010	<0.22		<0.43		<0.43		<0.43		<0.43		<0.43		<0.22		<0.43		<0.43		<0.43		<0.22		<0.55		<0.22		<0.22	
	MW620	4/14/2011	<0.43		<0.84		<0.84		<0.84		<0.84		<0.84		<0.43		<0.84		<0.84		<0.84		<0.43		<1.1		<0.43		<0.43	
	MW620	10/11/2011	<0.32		<0.32		<0.32		<0.61		<0.61		<0.61		<0.32		<0.61		<0.61		<0.61		<0.32		<0.77		<0.32		<0.32	U / UJ
	MW620	10/26/2012	<0.16		0.29	F /	0.13	F /	<0.31		<0.31		<0.31		<0.16		0.28	F /	<0.31		1.5	/ J	<0.16		<0.39		<0.16		<0.16	
	MW620	10/18/2013	<0.41		<0.31		<0.21		<0.21		<0.21		<0.41		<0.41		<0.41		<0.41		<1		<0.21		<0.25		<1		<0.41	
	MW620	12/10/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
	Compliance																													
	MW621	10/13/2006	<0.57		<0.57		<1.1		<1.1		<1.1		<1.1		<0.57		<1.1		<1.1		<1.1		<0.57		<1.1		<0.57		<0.57	
	MW621	10/13/2006 (DUP)	<0.46		<0.46		<0.91		<0.91		<0.91		<0.91		<0.46		<0.91		<0.91		<0.91		<0.46		<0.91		<0.46		<0.46	
	MW621	4/27/2007	<0.48		<0.48		<0.96		<0.96		<0.96		<0.96		<0.48		<0.96		<0.96		<0.96		<0.48		<0.96		<0.48		<0.48	
	MW621	10/17/2007	<0.74		<0.74		<1.5		<1.5		<1.5		<1.5		<0.74		<1.5		<1.5		<1.5		<0.74		<1.5		<0.74		<0.74	
	MW621	10/17/2007 (DUP)	<0.69		<0.69		<1.4		<1.4		<1.4		<1.4		<0.69		<1.4		<1.4		<1.4		<0.69		<1.4		<0.69		<0.69	
	MW621	5/19/2008	<0.59		<0.59		<1.2		<1.2		<1.2		<1.2		<0.59		<1.2		<1.2		<1.2		<0.59		<1.2		<0.59		<0.59	
	MW621	10/23/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW621	5/1/2009	<0.16		<0.31		<0.31		<0.31		<0.31		2.5		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	MW621	10/26/2009	<0.2		<0.38		<0.38		<0.38		<0.38		<0.38		<0.2		<0.38		<0.38		<0.38		<0.2		<0.48		<0.2		<0.2	
	MW621	4/8/2010	<0.21		<0.40		<0.40		<0.40		<0.40		<0.40		<0.21		<0.40		<0.40		<0.40		<0.21		<0.51		<0.21		<0.21	
	MW621	10/27/2010	<0.19		<0.37		<0.37		<0.37		<0.37		<0.37		<0.19		<0.37		<0.37		<0.37		<0.19		<0.46		<0.19		<0.19	
	MW621	4/14/2011	<0.32		<0.61		<0.61		<0.61		<0.61		0.58	F /	<0.32		<0.61		<0.61		<0.61		0.18	F /	<0.77		<0.32		<0.32	
	MW621	10/11/2011	<0.27		<0.27		<0.27		<0.52		<0.52		<0.52		<0.27		<0.52		<0.52		<0.52		<0.27		<0.65		<0.27		<0.27	U / UJ
	MW621	10/26/2012	<0.16		0.42		<0.31		<0.31		<0.31		<0.31		<0.16		0.24	F /	<0.31		0.4		<0.16		<0.39		<0.16		<0.16	
	MW621	10/18/2013	<0.43		<0.32		<0.21		<0.21		<0.21		<0.43		<0.43		<0.43		<0.43		<1.1		<0.21		<0.26		<1.1		<0.43	
	MW621	12/10/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
	SW555	10/13/2006	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	SW555	4/27/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	SW555	10/17/2007	<0.49		<0.49		<0.98		<0.98		<0.98		<0.98		<0.49		<0.98		<0.98		<0.98		<0.49		<0.98		<0.49		<0.49	
	SW555	10/17/2007 (DUP)	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	SW555	5/19/2008	<0.71		<0.71		<1.4		<1.4		<1.4		<1.4		<0.71		<1.4		<1.4		<1.4		<0.71		<1.4		<0.71		<0.71	
	SW555	10/23/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	SW555	10/23/2008 (DUP)	<0.4		<0.4		<0.79		<0.79		<0.79		<0.79		<0.4		<0.79		<0.79		<0.79		<0.4		<0.79		<0.4		<0.4	
	SW555	5/1/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	SW555	10/26/2009	<0.2		<0.38		<0.38		<0.38		<0.38		<0.38		<0.2		0.3	F /	<0.38		<0.38		<0.2		<0.48		<0.2		<0.2	
	SW555	4/8/2010	<0.21		<0.40		<0.40		<0.40		<0.40		<0.40		<0.21		<0.40		<0.40		<0.40		<0.21		<0.50		<0.21		<0.21	
	SW555	10/27/2010	<0.19		<0.36		<0.36		<0.36		<0.36		<0.36		<0.19		<0.36		<0.36		<0.36		<0.19		<0.46		<0.19		<0.19	
	SW555	4/14/2011	<0.17		<0.32		<0.32		<0.32		<0.32		<0.32		<0.17		<0.32		<0.32		<0.32		<0.17		<0.4		<0.17		<0.17	
	SW555	10/11/2011	<0.25		<0.25		<0.25		<0.49		<0.49		<0.49		<0.25		<0.49		<0.49		<0.49		<0.25		<0.62		<0.25		<0.25	U / UJ
	SW555	10/26/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	SW555	10/18/2013	<0.43		<0.33		<0.22		<0.22		<0.22		<0.43		<0.43		<0.43		<0.43		<1.1		<0.22		<0.26		<1.1		<0.43	
	SW555	12/10/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit(1)	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
L3	*Upgradient*																													
	SW004	5/6/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/23/2009	<0.43		<0.84		<0.84		<0.84		<0.84		<0.84		<0.43		<0.84		<0.84		<0.84		<0.43		<1.1		<0.43		<0.43	
		4/8/2010	<0.34		<0.65		<0.65		<0.65		<0.65		<0.65		<0.34		<0.65		<0.65		<0.65		<0.34		<0.82		<0.34		<0.34	
		10/26/2010	<0.49		<0.96		<0.96		<0.96		<0.96		<0.96		<0.49		<0.96		<0.96		<0.96		<0.49		<1.2		<0.49		<0.49	
		10/26/2010 (DUP)	<0.48		<0.93		<0.93		<0.93		<0.93		<0.93		<0.48		<0.93		<0.93		<0.93		<0.48		<1.2		<0.48		<0.48	
		4/14/2011	<0.22		<0.43		<0.43		<0.43		<0.43		<0.43		<0.22		<0.43		<0.43		<0.43		<0.22		<0.54		<0.22		<0.22	
		4/14/2011 (DUP)	<0.17		<0.33		<0.33		<0.33		<0.33		<0.33		<0.17		<0.33		<0.33		<0.33		<0.17		<0.42		<0.17		<0.17	
		10/14/2011	<0.41		<0.41		<0.41		<0.79		<0.79		<0.79		<0.41		<0.79		<0.79		<0.79		<0.41		<0.99		<0.41		<0.41	
		4/12/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2013	<0.71		<0.71		<0.35		<0.35		<0.35		<0.71		<0.71		<0.71		<0.71		<1.8		<0.35		<0.42		<1.8		<0.71	
		10/23/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
	In-Plume																													
	MW410	5/21/2008	<0.41		<0.41		<0.82		<0.82		<0.82		<0.82		<0.41		<0.82		<0.82		<0.82		**3.3**		<0.82		<0.41		<0.41	
		10/29/2008	<0.47		<0.47		<0.95		<0.95		<0.95		<0.95		<0.47		<0.95		<0.95		<0.95		<0.47		<0.95		<0.47		<0.47	
		5/7/2009	<0.24		<0.47		<0.47		<0.47		<0.47		<0.47		<0.24		<0.47		<0.47		<0.47		<0.24		<0.59		<0.24		<0.24	
		4/8/2010	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/26/2010	<0.23		<0.44		<0.44		<0.44		<0.44		<0.44		<0.23		<0.44		<0.44		<0.44		<0.23		<0.55		<0.23		<0.23	
		4/14/2011	<0.31		<0.61		<0.61		<0.61		<0.61		<0.61		<0.31		<0.61		<0.61		<0.61		<0.31		<0.77		<0.31		<0.31	
		10/14/2011	<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.19		<0.38		<0.38		<0.38		<0.19		<0.47		<0.19		<0.19	
		4/11/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/30/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2013	<0.39		<0.39		<0.2		<0.2		<0.2		<0.39	U / Q	<0.39	U / Q	<0.39	U / Q	<0.39		<0.99	U / Q	<0.2		<0.24		<0.99		<0.39	
		10/21/2013	<0.38	U / UJ	<0.28	U / UJ	<0.19	U / UJ	<0.19	U / UJ	<0.19	U / UJ	<0.38	U / UJ	<0.38	U / UJ	<0.38	U / UJ	<0.38	U / UJ	<0.94	U / UJ	<0.19	U / UJ	<0.23	U / UJ	<0.94	U / UJ	<0.38	U / UJ
		10/23/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
		12/10/2014	<0.39		<0.39		<0.2		<0.2	U / UJ	<0.2		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24		<0.98		<0.39	
	In-Plume/Downgradient																													
	MW412	5/21/2008	<0.39		<0.39		<0.78		1.2		1.8		51		<0.39		<0.78		<0.78		<0.78		**440**		<0.78		<0.39		<0.39	
		10/29/2008	<0.44		<0.44		<0.88		0.98		1.7		34		<0.44		<0.88		<0.88		<0.88		**170**		<0.88		<0.44		<0.44	
		10/29/2008 (DUP)	<0.4		<0.4		<0.79		1.1		1.8		42		<0.4		<0.79		<0.79		<0.79		**250**		<0.79		<0.4		<0.4	
		5/6/2009	<0.16		<0.31		<0.31		0.93		1.4		35		<0.16		<0.31		<0.31		<0.31		**210**		<0.39		<0.16		<0.16	
		10/27/2009	<0.17		<0.33		<0.33		0.96		1.6		30	/ J	<0.17		<0.33		<0.33		<0.33		**130**		<0.42		<0.17		<0.17	
		4/12/2010	<0.18		<0.35		<0.35		1		1.6		38		<0.18		<0.35		<0.35		<0.35		**220**		<0.44		<0.18		<0.18	
		10/26/2010	<0.23		<0.45		<0.45		1.3		1.8		29		<0.23		<0.45		<0.45		<0.45		**200**		<0.57		<0.23		<0.23	
		4/14/2011	<0.28		<0.54		<0.54		0.94		<0.54		26		<0.28		<0.54		<0.54		<0.54		**110**		<0.68		<0.28		<0.28	
		10/17/2011	<0.22		<0.22		<0.22		<0.42		<0.42		19		<0.22		<0.42		<0.42		<0.42		**67**		<0.53		<0.22		<0.22	U / UJ
		4/11/2012	<0.16		<0.31		<0.31		0.89		1.7		28	/ J	0.24		<0.31		<0.31		<0.31		**120**		<0.39		0.11	F / J	<0.16	
		10/30/2012	<0.16		<0.31		<0.31		<0.31		1.9		26		<0.16		<0.31		<0.31		<0.31		**120**		<0.39		<0.16		<0.16	
		4/15/2013	<0.39	U / UJ	<0.39	U / UJ	<0.19	U / UJ	0.38	/ JJ	0.51	/ JJ	20	/ JJQ	<0.39	U / UJQ	<0.39	U / UJQ	<0.39	U / UJ	<0.97	U / UJQ	**74**	/ JJ	<0.23	U / UJ	<0.97	U / UJ	<0.39	U / UJ
		10/21/2013	<0.38		<0.28		<0.19		1.1	/ J	1.5	/ J	30	/ J	<0.38		<0.38		<0.38		<0.95		**140**	/ J	<0.23		<0.95		<0.38	
		10/21/2013 (DUP)	<0.38		<0.28		<0.19		0.83	/ J	1.1	/ J	27	/ J	<0.38		<0.38		<0.38		<0.94		**120**	/ J	<0.23		<0.94		<0.38	
		10/23/2014	<0.4		<0.4		<0.2		0.91		1.4		29		<0.4		<0.4		<0.4		<0.99		**85**		<0.24	U / UJ	<0.99		<0.4	
		12/10/2014	<3.9		<0.39		<0.19		0.72	/ J	<1.9		24	/ J	<0.39		<0.39		<0.39		<0.97		**85**	/ J	<0.23		<0.97		<0.39	
	Early Warning/Downgradient																													
	MW630	5/20/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		0.83		<0.78		<0.39		<0.39	
		10/28/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/6/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/26/2009	<0.16		<0.32		<0.32		<0.32		<0.32		0.83	/ J	<0.16		<0.32		<0.32		<0.32		0.96		<0.4		<0.16		<0.16	
		4/9/2010	<0.25		<0.49		<0.49		<0.49		<0.49		3.7	/ J	<0.25		<0.49		<0.49		<0.49		**8.9**		<0.62		<0.25		<0.25	
		4/9/2010 (DUP)	<0.18		<0.35		<0.35		<0.35		<0.35		4.8	/ J	<0.18		<0.35		<0.35		<0.35		**11**		<0.44		<0.18		<0.18	
		10/26/2010	<0.57		<1.1		<1.1		<1.1		<1.1		<1.1		<0.57		<1.1		<1.1		<1.1		<0.57		<1.4		<0.57		<0.57	
		4/14/2011	<0.26		<0.5		<0.5		<0.5		<0.5		6.6		<0.26		<0.5		<0.5		<0.5		**13**		<0.62		<0.26		<0.26	
		10/14/2011	<0.45		<0.45		<0.45		<0.88		<0.88		4		<0.45		<0.88		<0.88		<0.88		**8**		<1.1		<0.45		<0.45	
		10/14/2011 (DUP)	<0.22		<0.22		<0.22		<0.43		<0.43		4.6		<0.22		<0.43		<0.43		<0.43		**7.8**		<0.54		<0.22		<0.22	
		4/11/2012	<0.16		<0.31		<0.31		0.077	F / J	0.18	F / J	4.7	/ J	<0.16		<0.31		<0.31		<0.31		**8.7**		<0.39		<0.16		<0.16	
		4/11/2012 (DUP)	<0.16		<0.31		<0.31		0.072	F / J	0.15	F / J	4.7	/ J	<0.16		<0.31		<0.31		<0.31		**8.7**		<0.39		<0.16		<0.16	
		10/30/2012	<0.16		<0.31		<0.31		<0.31		<0.31		0.35		<0.16		<0.31		<0.31		<0.31		0.36		<0.39		<0.16		<0.16	
		4/16/2013	<0.39		<0.39		<0.19		0.1	F / J	0.17	F / J	4.5	/ Q	<0.39	U / Q	<0.39	U / Q	<0.39		<0.97	U / Q	**6.1**		<0.23		<0.97		<0.39	
		10/21/2013	<0.38		<0.29		<0.19		<0.19		<0.19		0.79		<0.38		<0.38		<0.38		<0.95		0.66		<0.23		<0.95		<0.38	
		10/21/2013 (DUP)	<0.38		<0.29		<0.19		<0.19		<0.19		0.78		<0.38		<0.38		<0.38		<0.96		0.66		<0.23		<0.96		<0.38	
		10/23/2014	<0.38		<0.38		<0.19		<0.19		<0.19		2.4		<0.38		<0.38	U / UJ	<0.38		<0.95		**3.5**		<0.23	U / UJ	<0.95		<0.38	
		10/23/2014 (DUP)	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		2.2		<0.4		<0.4		<0.4		<1		**3.4**		<0.24	U / UJ	<1		<0.4	
		12/10/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		2.8		<0.4		<0.4		<0.4		<0.99		**5**		<0.24		<0.99		<0.4	
		12/10/2014 (DUP)	<0.39		<0.39		<0.2		<0.2	U / UJ	<0.2		3		<0.39		<0.39		<0.39		<0.99		**5.4**		<0.24		<0.99		<0.39	

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**1,3-DNB**		**2,4-DNT**		**2,6-DNT**		**2-A-4,6-DNT**		**4-A-2,6-DNT**		**HMX**		**NB**		**2-NT**		**3-NT**		**4-NT**		**RDX**		**Tetryl**		**1,3,5-TNB**		**2,4,6-TNT**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[1]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
L3	***Early Warning/Downgradient***																													
	MW631	5/20/2008	<0.49		<0.49		<0.99		<0.99		<0.99		<0.99		<0.49		<0.99		<0.99		<0.99		<0.49		<0.99		<0.49		<0.49	
		10/28/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/6/2009	<0.27		<0.53		<0.53		<0.53		<0.53		<0.53		<0.27		<0.53		<0.53		<0.53		<0.27		<0.66		<0.27		<0.27	
		10/26/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/9/2010	<0.24		<0.46		<0.46		<0.46		<0.46		<0.46		<0.24		<0.46		<0.46		<0.46		<0.24		<0.58		<0.24		<0.24	
		10/26/2010	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/14/2011	<0.23		<0.45		<0.45		<0.45		<0.45		<0.45		<0.23		<0.45		<0.45		<0.45		<0.23		<0.57		<0.23		<0.23	
		10/14/2011	<0.23		<0.23		<0.23		<0.44		<0.44		<0.44		<0.23		<0.44		<0.44		<0.44		<0.23		<0.56		<0.23		<0.23	
		4/11/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/30/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/30/2012 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2013	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39	U / Q	<0.39	U / Q	<0.39	U / Q	<0.39		<0.96	U / Q	<0.19		<0.23		<0.96		<0.39	
		10/21/2013	<0.38		<0.29		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23		<0.95		<0.38	
		10/21/2013 (DUP)	<0.39		<0.29		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23		<0.97		<0.39	
		10/23/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
		10/23/2014 (DUP)	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
		12/10/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.96		<0.19		<0.23		<0.96		<0.38	
		12/10/2014 (DUP)	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23		<0.95		<0.38	
	MW633	5/21/2008	<0.39		<0.39		<0.78		1		1.7		47		<0.39		<0.78		<0.78		<0.78		**390**		<0.78		<0.39		<0.39	
		5/21/2008 (DUP)	<0.39		<0.39		<0.78		0.88		1.4		43		<0.39		<0.78		<0.78		<0.78		**280**		<0.78		<0.39		<0.39	
		10/29/2008	<0.4		<0.4		<0.81		<0.81		<0.81		1.1		<0.4		<0.81		<0.81		<0.81		**4.5**		<0.81		<0.4		<0.4	
		5/6/2009	<0.17		<0.33		<0.33		<0.33		<0.33		5.7		<0.17		<0.33		<0.33		<0.33		**33**		<0.41		<0.17		<0.17	
		10/27/2009	<0.16		<0.31		<0.31		<0.31		<0.31		2	/ J	<0.16		<0.31		<0.31		<0.31		**7.7**		<0.39		<0.16		<0.16	
		4/12/2010	<0.18		<0.34		<0.34		<0.34		<0.34		8.4		<0.18		<0.34		<0.34		<0.34		**56**		<0.43		<0.18		<0.18	
		10/26/2010	<0.32		<0.61		<0.61		<0.61		<0.61		3.9		<0.32		<0.61		<0.61		<0.61		**16**		<0.77		<0.32		<0.32	
		4/14/2011	<0.39		<0.76		<0.76		<0.76		<0.76		1.2		<0.39		<0.76		<0.76		<0.76		**4.2**		<0.96		<0.39		<0.39	
		10/17/2011	<0.39		<0.39		<0.39		<0.76	U / UJ	<0.76		3.1		<0.39		<0.76		<0.76		<0.76		**7.9**		<0.96		<0.39		<0.39	
		4/11/2012	<0.16		<0.31		<0.31		<0.31		<0.31		2	/ J	<0.16		<0.31		<0.31		<0.31		**6.7**		<0.39		<0.16		<0.16	
		10/30/2012	<0.16		<0.31		0.13	F / J	<0.31		<0.31		2.7		<0.16		<0.31		<0.31		<0.31		**10**		<0.39		<0.16		<0.16	
		4/15/2013	<0.38	U / UJ	<0.38	U / UJ	<0.19	U / UJ	<0.19	U / UJ	<0.19	U / UJ	0.43	/ JQ	<0.38	U / UJQ	<0.38	U / UJQ	<0.38	U / UJ	<0.94	U / UJQ	1.6	/ J	<0.23	U / UJ	<0.94	U / UJ	<0.38	U / UJ
		4/15/2013 (DUP)	<0.42		<0.42		<0.21		<0.21		<0.21		0.6	/ Q	<0.42	U / Q	<0.42	U / Q	<0.42		<1	U / Q	2.4		<0.25		<1		<0.42	
		10/21/2013	<0.37		<0.28		<0.19		<0.19		<0.19		2		<0.37		<0.37		<0.37		<0.93		**6.9**		<0.22		<0.93		<0.37	
		10/23/2014	<0.37		<0.37		<0.18		<0.18		<0.18		1.3		<0.37		<0.37		<0.37		<0.92		**3.8**		<0.22	U / UJ	<0.92		<0.37	
		12/10/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		0.97		<0.38		<0.38		<0.38		<0.96		**2.9**		<0.23		<0.96		<0.38	
	Compliance/Downgradient																													
	SW777	5/20/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/23/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/7/2009	<0.19		<0.38		<0.38		<0.38		<0.38		<0.38		<0.19		<0.38		<0.38		<0.38		<0.19		<0.47		<0.19		<0.19	
		10/23/2009	<0.4		<0.78		<0.78		<0.78		<0.78		<0.78		<0.4		<0.78		<0.78		<0.78		<0.4		<0.98		<0.4		<0.4	
		4/9/2010	<0.19		<0.37		<0.37		<0.37		<0.37		<0.37		<0.19		<0.37		<0.37		<0.37		<0.19		<0.46		<0.19		<0.19	
		10/26/2010	<0.55		<1.1		<1.1		<1.1		<1.1		<1.1		<0.55		<1.1		<1.1		<1.1		<0.55		<1.3		<0.55		<0.55	
		4/14/2011	<0.34		<0.66		<0.66		<0.66		<0.66		<0.66		<0.34		<0.66		<0.66		<0.66		<0.34		<0.83		<0.34		<0.34	
		10/14/2011	<0.34		<0.34		<0.34		<0.65		<0.65		<0.65		<0.34		<0.65		<0.65		<0.65		<0.34		<0.82		<0.34		<0.34	
		4/11/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		0.25		<0.39		<0.16		<0.16	
		10/30/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2013	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4	U / Q	<0.4	U / Q	<0.4	U / Q	<0.4		<1	U / Q	<0.2		<0.24		<1		<0.4	
		10/21/2013	<0.38		<0.29		<0.19		<0.19		<0.19		0.55	/ J	<0.38		<0.38		<0.38		<0.96		1.4		<0.23		<0.96		<0.38	
		10/23/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		12/10/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.96		<0.19		<0.23		<0.96		<0.38	
	Downgradient																													
	SW557	5/20/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/23/2008	<0.47		<0.47		<0.95		<0.95		<0.95		<0.95		<0.47		<0.95		<0.95		<0.95		<0.47		<0.95		<0.47		<0.47	
		5/7/2009	<0.22		<0.42		<0.42		<0.42		<0.42		<0.42		<0.22		<0.42		<0.42		<0.42		<0.22		<0.53		<0.22		<0.22	
		5/7/2009 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31	U / UJ	<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/23/2009	<0.43		<0.83		<0.83		<0.83		<0.83		<0.83		<0.43		<0.83		<0.83		<0.83		<0.43		<1		<0.43		<0.43	
		10/23/2009 (DUP)	<0.43		<0.83		<0.83		<0.83		<0.83		<0.83		<0.43		<0.83		<0.83		<0.83		<0.43		<1		<0.43		<0.43	
		4/9/2010	<0.26		<0.51		<0.51		<0.51		<0.51		<0.51		<0.26		<0.51		<0.51		<0.51		<0.26		<0.64		<0.26		<0.26	
		4/9/2010 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/26/2010	<0.37		<0.71		<0.71		<0.71		<0.71		<0.71		<0.37		<0.71		<0.71		<0.71		<0.37		<0.89		<0.37		<0.37	
		4/14/2011	<0.41		<0.79		<0.79		<0.79		<0.79		<0.79		<0.41		<0.79		<0.79		<0.79		<0.41		<0.99		<0.41		<0.41	
		10/14/2011	<0.47		<0.47		<0.47		<0.91		<0.91		<0.91		<0.47		<0.91		<0.91		<0.91		<0.47		<1.2		<0.47		<0.47	
		4/10/2012	<0.16		<0.31		<0.31		<0.31		<0.31		1.1	/ J	<0.16		<0.31		<0.31		<0.31		3.2		<0.39		<0.16		<0.16	
		10/30/2012	<0.16		<0.31		0.44	/ J	<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2013	<0.68		<0.68		<0.34		<0.34		<0.34		<0.68		<0.68		<0.68		<0.68		<1.7		<0.34		<0.41		<1.7		<0.68	
		10/21/2013	<0.39		<0.3		<0.2		<0.2		<0.2		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24		<0.98		<0.39	
		10/23/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
		12/10/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23		<0.94		<0.38	

TABLE B1

Summary of Analytical Results - Explosives
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Will County, Illinois

		Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
L3	*Downgradient*																													
	SW558	5/20/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/23/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		4/14/2011	<0.17		<0.34		<0.34		<0.34		<0.34		<0.34		<0.17		<0.34		<0.34		<0.34		<0.17		<0.42		<0.17		<0.17	
		4/10/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2013	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4	U / Q	<0.4	U / Q	<0.4	U / Q	<0.4		<1	U / Q	<0.2		<0.24		<1		<0.4	
		4/16/2013	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4	U / Q	<0.4	U / Q	<0.4	U / Q	<0.4		<1	U / Q	<0.2		<0.24		<1		<0.4	
		10/23/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	
		12/10/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24		<0.99		<0.4	
L14	*In-Plume*																													
	MW511	10/25/2004	<0.39		<0.39 (0.12)		<0.78 (0.14)		<0.78		<0.78		13		<0.39		<0.78		<0.78		<0.78		**120**		<0.78		<0.39		<0.39	
		7/27/2005	<0.4		<0.4		<0.81		<0.81		<0.81		12		<0.4		<0.81		<0.81		<0.81		**130**		<0.81		<0.4		<0.4	
		10/24/2005	<0.6		<0.6		<1.2		<1.2		<1.2		9.8		<0.6		<1.2		<1.2		<1.2		**80**		<1.2		<0.6		<0.6	
		5/8/2006	<0.42		<0.42		<0.83		<0.83		<0.83		1.6		<0.42		<0.83		<0.83		<0.83		**5.5**		<0.83		<0.42		<0.42	
		10/16/2006	<0.6		<0.6		<1.2		<1.2		<1.2		14		<0.6		<1.2		<1.2		<1.2		**110**		<1.2		<0.6		<0.6	
		5/2/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/15/2007	<0.4		<0.4		<0.79		<0.79		<0.79		19		<0.4		<0.79		<0.79		<0.79		**170**		<0.79		<0.4		<0.4	
		5/20/2008	<0.4		<0.4		<0.81		<0.81		<0.81		<0.81		<0.4		<0.81		<0.81		<0.81		0.46		<0.81		<0.4		<0.4	
		10/28/2008	<0.39		<0.39		<0.78		<0.78		<0.78		7.3		<0.39		<0.78		<0.78		<0.78		**58**		<0.78		<0.39		<0.39	
		4/30/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/26/2009	<0.18		<0.36		<0.36		<0.36		<0.36		6.4		<0.18		0.29	F /	<0.36		<0.36		**31**		<0.45		<0.18		<0.18	
		4/7/2010	<0.38		<0.73		<0.73		<0.73		<0.73		<0.73		<0.38		<0.73		<0.73		<0.73		<0.38		<0.92		<0.38		<0.38	
		10/26/2010	<0.24		<0.47		<0.47		<0.47		<0.47		13		<0.24		<0.47		<0.47		<0.47		**110**		<0.59		<0.24		<0.24	
		4/18/2011	<0.18		<0.36		<0.36		<0.36		<0.36		0.14	F / J	<0.18		<0.36		<0.36		<0.36		0.94		<0.45		<0.18		<0.18	
		10/14/2011	<0.33		<0.33		<0.33		<0.65		<0.65		10		<0.33		<0.65		<0.65		<0.65		**84**		<0.81		<0.33		<0.33	
		10/26/2012	<0.16		0.41		0.17	F / J	<0.31		<0.31		11		<0.16		0.32		<0.31		0.5		**76**		<0.39		<0.16		<0.16	
		10/21/2013	<0.39		<0.29		<0.19		<0.19		<0.19		6.9		<0.39		<0.39		<0.39		<0.96		**22**		<0.23		<0.96		<0.39	
		12/9/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		24		<0.38		<0.38		<0.38		<0.96		**160**		<0.23		<0.96		<0.38	
	MW512	10/26/2004	<0.51		<0.51 (0.16)		<1 (0.19)		2.1		3.1		85		<0.51		<1		<1		<1		**230**		<1		<0.51		<0.51	
		7/27/2005	<0.47		<0.47		<0.95		2.3		3.4		90		<0.47		<0.95		<0.95		<0.95		**300**		<0.95		<0.47		<0.47	
		10/24/2005	<0.39		<0.39		<0.78		2		2.9		90		<0.39		<0.78		<0.78		<0.78		**190**		<0.78		<0.39		<0.39	
		5/8/2006	<0.75		<0.75		<1.5		<1.5		2.3		76		<0.75		<1.5		<1.5		<1.5		**290**		<1.5		<0.75		<0.75	
		10/16/2006	<0.55		<0.55		<1.1		2.7		3.8		91		<0.55		<1.1		<1.1		<1.1		**290**		<1.1		<0.55		<0.55	
		5/1/2007	<0.39		<0.39		<0.78		<0.78		<0.78		7.8		<0.39		<0.78		<0.78		<0.78		**11**		<0.78		<0.39		<0.39	
		10/15/2007	<0.51		<0.51		<1		1.8		2.6		84		<0.51		<1		<1		<1		**200**		<1		<0.51		<0.51	
		5/21/2008	<0.39		<0.39		<0.78		<0.78		<0.78		4.6		<0.39		<0.78		<0.78		<0.78		**10**		<0.78		<0.39		<0.39	
		5/21/2008 (DUP)	<0.39		<0.39		<0.78		<0.78		<0.78		4.5		<0.39		<0.78		<0.78		<0.78		**11**		<0.78		<0.39		<0.39	
		10/27/2008	<0.39		<0.39		<0.78		2		2.8		68		<0.39		<0.78		<0.78		<0.78		**190**		<0.78		<0.39		<0.39	
		10/27/2008 (DUP)	<0.42		<0.42		<0.83		2.1		3		70		<0.42		<0.83		<0.83		<0.83		**210**		<0.83		<0.42		<0.42	
		4/30/2009	<0.17		<0.33		<0.33		<0.33		<0.33		1.3		<0.17		<0.33		<0.33		<0.33		0.62		<0.42		<0.17		<0.17	
		10/23/2009	<0.28		<0.55		<0.55		0.6		0.83		20		<0.28		<0.55		<0.55		<0.55		**42**		<0.69		<0.28		<0.28	
		4/6/2010	<0.40		<0.78		<0.78		<0.78		<0.78		7.3		<0.40		<0.78		<0.78		<0.78		**11**		<0.98		<0.40		<0.40	
		10/26/2010	<0.31		<0.59		<0.59		1.7		2.4		61		<0.31		<0.59		<0.59		<0.59		**240**		<0.75		<0.31		<0.31	
		4/18/2011	<0.36		<0.70		<0.70		0.76		1.2		42	/ J	<0.36		<0.70		<0.70		<0.70		**150**		<0.88		<0.36		<0.36	
		10/14/2011	<0.28		<0.28		<0.28		0.82		<0.54		74		<0.28		<0.54		<0.54		<0.54		**400**		<0.68		<0.28		<0.28	
		10/26/2012	<0.16		0.39		0.18	F / J	1.5		2.1		58		<0.16		0.33		<0.31		0.5		**220**		<0.39		<0.16		<0.16	
		10/21/2013	<0.38		<0.28		<0.19		0.47		0.59		15		<0.38		0.082	F /	<0.38		<0.94		**28**		<0.23		<0.94		<0.38	
		12/9/2014	<0.38		<0.38		<0.19		0.75	/ J	1.1		36		<0.38		<0.38		<0.38		<0.95		**86**		<0.23		<0.95		<0.38	
	Early Warning																													
	H7	10/25/2004	<0.39		<0.39 (0.12)		<0.78 (0.14)		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		7/27/2005	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/24/2005	<0.62		<0.62		<1.2		<1.2		<1.2		<1.2		<0.62		<1.2		<1.2		<1.2		1.3		<1.2		<0.62		<0.62	
		5/8/2006	<0.49		<0.49		<0.98		<0.98		<0.98		<0.98		<0.49		<0.98		<0.98		<0.98		<0.49		<0.98		<0.49		<0.49	
		10/16/2006	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/2/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/15/2007	<0.63		<0.63		<1.3		<1.3		<1.3		<1.3		<0.63		<1.3		<1.3		<1.3		<0.63		<1.3		<0.63		<0.63	
		5/21/2008	<0.47		<0.47		<0.94		<0.94		<0.94		<0.94		<0.47		<0.94		<0.94		<0.94		<0.47		<0.94		<0.47		<0.47	
		10/27/2008	<0.44		<0.44		<0.87		<0.87		<0.87		<0.87		<0.44		<0.87		<0.87		<0.87		<0.44		<0.87		<0.44		<0.44	
		4/30/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/23/2009	<0.33		<0.64		<0.64		<0.64		<0.64		<0.64		<0.33		<0.64		<0.64		<0.64		0.4		<0.8		<0.33		<0.33	
		4/6/2010	<0.30		<0.59		<0.59		<0.59		<0.59		<0.59		<0.30		<0.59		<0.59		<0.59		<0.30		<0.74		<0.30		<0.30	
		10/26/2010	<0.17		<0.34		<0.34		<0.34		<0.34		<0.34		<0.17		<0.34		<0.34		<0.34		<0.17		<0.42		<0.17		<0.17	
		4/18/2011	<0.25		<0.48		<0.48		<0.48		<0.48		<0.48	U / UJ	<0.25		<0.48		<0.48		<0.48		<0.25		<0.60		<0.25		<0.25	
		10/14/2011	<0.29		<0.29		<0.29		<0.56		<0.56		<0.56		<0.29		<0.56		<0.56		<0.56		0.24	F /	<0.70		<0.29		<0.29	
		10/26/2012	<0.16		**1.5**		**0.58**		<0.31		<0.31		<0.31		<0.16		1.4		<0.31		1.5		0.97		<0.39		<0.16		<0.16	
		10/21/2013	<0.39		<0.29		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		0.44	/ J	<0.23		<0.97		<0.39	
		12/9/2014	<0.39		<0.39		<0.2		<0.2	U / UJ	<0.2		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24		<0.98		<0.39	

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L		μg/L	
		Project Action Limit(1)	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
MFG	***In-Plume***																													
(M6)	MW212R	10/21/2004	<3.9		**2800**		**860**		66	/ J	67		<7.8		14	/ J	**12000**		970		6500		<3.9		<7.8		<3.9		**210**	
		7/13/2005	<3.9		**490**		**200**		32		23		<7.8		<3.9		3500		290		1900		<3.9		<7.8		<3.9		**26**	B /
		10/18/2005	<39		**17000**		**3500**		340		320		<78		<39		**81000**		4000		47000		<39		<78		<39		**1000**	
		5/1/2006	<4.1		**2800**		**630**		34		28		<8.2		<4.1		**7500**		590		5800		<4.1		<8.2		<4.1		**260**	
		10/6/2006	<40		**6300**		**1800**		190		140		<81		<40		**31000**		2600		19000		<40		<81		<40		**880**	
		4/24/2007	<3.9		**650**		**250**		45		37		<7.8		<3.9		3300		370		2300		<3.9		<7.8		<3.9		**25**	
		10/10/2007	<39		**3800**		**1300**		190		200		<78		<39		**19000**		1700		12000		<39		<78		<39		**440**	
		5/9/2008	<4.8		**5700**		**1000**		70		72		<9.6		<4.8		**21000**		1300		15000		<4.8		<9.6		<4.8		**460**	
		5/9/2008 (DUP)	<3.9		4400		970		68		70		<7.8		4.3		17000		1200		12000		<3.9		<7.8		<3.9		450	
		10/16/2008	<0.42		<0.42		<0.83		<0.83		<0.83		<0.83		<0.42		<0.83		<0.83		<0.83		<0.42		<0.83		<0.42		<0.42	
		5/7/2009	<16		**1000**		**340**		<31		<31		<31	U / UJ	<16		1800		370		1300		<16		<39		<16		**150**	
		10/26/2009	<22		**4500**		**1200**		<43		<43		<43		<22		**20000**		1600		11000		<22		<55		<22		**870**	
		4/9/2010	<0.24		**95**		**84**		15		13		<0.46		<0.24		4.8		39		<0.46		<0.24		<0.58		<0.24		8.2	
		11/2/2010	<2.0		**140**		**280**		19		14		<3.8		<2.0		2900		260		1700		<2.0		<4.8	U / UJ	<2.0		**67**	
		4/21/2011	<28		**2400**		**730**		70		73		<54		<28		4800	/ J	710	/ J	2100	/ J	<28		<68		<28		**230**	/ J
		4/21/2011 (DUP)	<25		**2900**		**870**		64		74		<49		<25		**8100**	/ J	920	/ J	4200	/ J	<25		<61		<25		**350**	/ J
		10/19/2011	<35		**2700**		**1100**		100		57	F / NJ	<68		<35		**12000**		<68		7500		<35		<86		<35		**230**	
		10/19/2011 (DUP)	<30		**2700**		**1000**		120		54	F / J	<59		<30		**12000**		<59		7700		<30		<74		<30		**210**	
		4/15/2012	1.1	F /	**620**		**260**		64	/ J	51	/ J	<3.1		1.9		4100		<3.1		2100		<1.6		<3.9		<1.6		**39**	
		10/23/2012	<16		**2500**		**640**		270	/ J	160	/ J	<31		<16		**12000**		<31		6700		<16		<39		<16		**200**	
		10/23/2012 (DUP)	<16		**3200**		**920**		290	/ J	170	/ J	<31		<16		**15000**		<31		7900		<16		<39		<16		**340**	
		4/11/2013	10	/ J	**1500**	/ J	**440**	/ J	37	F / JJ	56	/ J	<0.38	U / UJ	3.4	/ J	<0.38	U / UJ	370	/ J	2400	/ J	0.18	F / J	<0.23	U / UJ	1.6	/ J	**140**	/ J
		4/11/2013 (DUP)	1.9	/ J	**1400**	/ J	**430**	/ J	30	F / JJ	49	/ J	<0.37	U / UJ	2.4	/ J	500	/ J	370	/ J	2400	/ J	0.17	F / J	<0.22	U / UJ	2.3	/ J	**150**	
		10/17/2013	10	/ J	**7600**		**2200**		140	/ J	160		<4.2		14		**28000**		2100		18000		2.4	/ J	<2.5		**37**	/ J	**1300**	F /
		10/22/2014	1.5	/ J	**620**	/ J	**300**	/ J	37	/ J	24	/ J	<0.39		1.6	/ J	1800	/ J	490	/ J	1700	/ J	<0.2		<0.24	U / UJ	<0.98		**60**	/ J
		10/22/2014 (DUP)	1.7	/ J	**590**	/ J	**300**	/ J	24	/ J	19	/ J	<0.4		3.3	/ J	1700	/ J	390	/ J	1600	/ J	<0.2		<0.24	U / UJ	<1		**85**	/ J
		12/18/2014	<810		**5800**		**1500**		<410		<410		<810		<810		**22000**		1900		12000		<410		<2.4		**8.4**	F /	**940**	
		12/18/2014 (DUP)	<800		**3800**		**930**		<400		<400		<800		<800		**14000**		1400		8600		<400		<480		3.2	F /	**460**	
	MW652	10/21/2004	**13**		**10000**		**4900**		300	/ J	190		<7.8		39		**47000**		3700		31000		<3.9		<7.8		<3.9		**2300**	
		10/21/2004 (DUP)	**13**		**14000**		**4900**	/ J	290	/ J	180		<10		38		**66000**		3800		43000		<5.1		<10		<5.1		**2400**	
		7/13/2005	<58		**10000**		**3500**		280		<120		<120		<58		**56000**		3900		37000		<58		<120		<58		**2200**	B /
		10/18/2005	9.3		**21000**		**5400**		270		130		<7.8		25		**98000**		5700		65000		<3.9		<7.8		<3.9		**3400**	
		5/1/2006	<39		**2900**		**970**		<78		<78		<78		<39		**11000**		1000		8100		<39		<78		<39		**560**	
		10/6/2006	<42		**5100**		**1800**		140		91		<85		<42		**23000**		1900		15000		<42		<85		<42		**1300**	
		4/24/2007	<3.9		**2200**		**670**		60		35		<7.8		<3.9		**9000**		820		6700		<3.9		<7.8		<3.9		**450**	
		10/10/2007	<39		**4600**		**1700**		160		120		<78		<39		**20000**		1700		13000		<39		<78		<39		**1100**	
		5/7/2008	4.8		**3800**		**1300**		80		90		<7.8		9.7		**17000**		1400		12000		<3.9		<7.8		<3.9		**710**	
		5/7/2008 (DUP)	5.1		4100		1300		85		96		<7.8		10		18000		1600		13000		<3.9		<7.8		<3.9		710	
		10/16/2008	<3.9		**4200**		**2700**		120		99		<7.8		<3.9		**17000**		1500		12000		<3.9		<7.8		<3.9		**910**	
		10/16/2008 (DUP)	<3.9		**4400**		**2100**		130		100		<7.8		<3.9		**18000**		1500		12000		<3.9		<7.8		<3.9		**850**	
		5/7/2009	<16		**2000**		**630**		<31		<31		<31	U / UJ	<16		**5300**		680		5500		<16		<39		<16		**340**	
		10/26/2009	<21		**4900**		**1500**		120		120		<41		<21		**23000**		1700		14000		<21		<51		<21		**810**	
		4/9/2010	<29		**8000**		**2800**		<57		<57		<57		<29		**36000**		2800		25000		<29		<72		<29		**1400**	
		11/2/2010	<2.1		**5800**		**2800**		180		120		<4.1		<2.1		**28000**		2000		18000		<2.1		<5.2	U / UJ	<2.1		**1200**	
		4/21/2011	<23		**5400**		**1400**		75		73		<44		<23		**24000**		1700	/ J	17000		<23		<56		<23		**770**	
		4/21/2011 (DUP)	<18		**5900**		**1500**		79		79		<36		<18		**27000**		2300	/ J	20000		<18		<45		<18		**870**	
		10/19/2011	<20		**2800**		**1500**		86		60	/ J	<39		<20		**13000**		<39		8100		<20		<49		<20		**520**	
		10/19/2011 (DUP)	<32		**3000**		**1700**		96		69	/ J	<63		<32		**14000**		<63		9000		<32		<79		<32		**590**	
		4/14/2012	9.5	F /	**8400**		**3300**		360		380	/ J	<31		<16		**44000**		<31		28000		<16		<39		<16		**1600**	
		4/14/2012 (DUP)	7.9	F /	**6800**		**2700**		320		320	/ J	<31		<16		**35000**		<31		22000	/ J	<16		<39		<16		**1300**	
		10/23/2012	<16		**5100**		**2000**		280	/ J	230	/ J	<31		<16		**23000**		<31		14000		<16		<39		<16		**950**	
		4/10/2013	1.8	/ JJ	**1700**	/ J	**480**	/ J	33	/ J	71	/ JJ	<0.41	U / UJ	4.3	/ JJ	**7800**	/ J	760	/ J	5100	/ J	0.48	/ JJ	<0.24	U / UJ	3	/ J	**270**	F / J
		10/17/2013	2.2	/ J	**1100**		**360**		35	F / J	80		<0.4		3.5	/ J	4600		390		2900		<0.2		<0.24		3.2	/ J	**200**	
		10/22/2014	**14**	/ J	**5100**	/ J	**3000**	/ J	150	/ J	170	/ J	<4		27	/ J	**17000**	/ J	2700	/ J	16000	/ J	<2		<2.4	U / UJ	<10		**1200**	/ J
		12/18/2014	7.8		**4700**		**1800**		97		130		<810		17		**19000**		2100		15000		<2		<2.4		<10		**610**	

TABLE B1

Summary of Analytical Results - Explosives
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Will County, Illinois

		Compound	**1,3-DNB**		**2,4-DNT**		**2,6-DNT**		**2-A-4,6-DNT**		**4-A-2,6-DNT**		**HMX**		**NB**		**2-NT**		**3-NT**		**4-NT**		**RDX**		**Tetryl**		**1,3,5-TNB**		**2,4,6-TNT**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
MFG	***Early Warning***																													
(M6)		10/20/2004	<0.65		<0.65 (0.2)		<1.3 (0.24)		<1.3		<1.3		<1.3		<0.65		<1.3		<1.3		<1.3		<0.65		<1.3		<0.65		<0.65	
		7/18/2005	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/17/2005	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/1/2006	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/10/2006	<0.57		<0.57		<1.1		<1.1		<1.1		<1.1		<0.57		<1.1		<1.1		<1.1		<0.57		<1.1		<0.57		<0.57	
		4/25/2007	<0.54		<0.54		<1.1		<1.1		<1.1		<1.1		<0.54		<1.1		<1.1		<1.1		<0.54		<1.1		<0.54		<0.54	
		10/11/2007	<0.46		<0.46		<0.91		<0.91		<0.91		<0.91		<0.46		<0.91		<0.91		<0.91		<0.46		<0.91		<0.46		<0.46	
		5/8/2008	<0.53		<0.53		<1.1		<1.1		<1.1		<1.1		<0.53		<1.1		<1.1		<1.1		<0.53		<1.1		<0.53		<0.53	
		10/20/2008	<0.45		<0.45		<0.9		<0.9		<0.9		<0.9		<0.45		<0.9		<0.9		<0.9		<0.45		<0.9		<0.45		<0.45	
		10/20/2008 (DUP)	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/6/2009	<0.2		<0.39		<0.39		<0.39		<0.39		<0.39		<0.2		<0.39		<0.39		<0.39		<0.2		<0.49		<0.2		<0.2	
	MW123R	10/26/2009	<0.2		<0.39		<0.39		<0.39		<0.39		<0.39		<0.2		<0.39		<0.39		<0.39		<0.2		<0.49		<0.2		<0.2	
		4/8/2010	<0.24		<0.47		<0.47		<0.47		<0.47		<0.47		<0.24		<0.47		<0.47		<0.47		<0.24		<0.59		<0.24		<0.24	
		11/1/2010	<0.19		<0.37		<0.37		<0.37		<0.37		<0.37		<0.19		1		<0.37		0.46		<0.19		<0.46		<0.19		<0.19	
		4/20/2011	<0.26		<0.51		<0.51		<0.51		<0.51		<0.51		<0.26		<0.51		<0.51		<0.51		<0.26		<0.64		<0.26		<0.26	
		10/18/2011	<0.34		<0.34		<0.34		<0.65		<0.65		<0.65		<0.34		<0.65		<0.65		<0.65		<0.34		<0.82		<0.34		<0.34	
		4/14/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/14/2012 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/23/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/10/2013	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
		10/17/2013	<0.42	U / UJ	<0.32	U / UJ	<0.21	U / UJ	<0.21	U / UJ	<0.21	U / UJ	<0.42	U / UJ	<0.42	U / UJ	<0.42	U / UJ	<0.42	U / UJ	<1.1	U / UJ	<0.21	U / UJ	<0.25	U / UJ	<1.1	U / UJ	<0.42	U / UJ
		10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		12/17/2014	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
(M7)	***Early Warning***																													
		10/20/2004	<4.8		<4.8 (1.5)		<9.6 (1.8)		35		37		<9.6		<4.8		<9.6		<9.6		<9.6		<4.8		<9.6		<4.8		**74**	
		10/20/2004 (DUP)	<6.4		<6.4 (2)		<13 (2.3)		45		47		<13		<6.4		<13		<13		<13		**8**		<13		<6.4		**99**	
		7/18/2005	<6.9		<6.9		<14		43		46		<14		<6.9		<14		<14		<14		<6.9		<14		<6.9		**86**	
		7/18/2005 (DUP)	<5.8		<5.8		<12		43		45		<12		<5.8		<12		<12		<12		<5.8		<12		<5.8		**84**	
		10/21/2005	<2.1		**6.3**		<4.2		48		48		<4.2		<2.1		<4.2		<4.2		<4.2		**4.1**		<4.2		<2.1		**41**	
		10/21/2005 (DUP)	<1.9		**6.9**		<3.8		52		52		<3.8		<1.9		<3.8		<3.8		<3.8		**4.2**		<3.8		<1.9		**42**	
		5/4/2006	<3.9		<3.9		<7.8		13		16		<7.8		<3.9		<7.8		<7.8		<7.8		**4.6**		<7.8		<3.9		**32**	
		5/4/2006 (DUP)	<3.9		<3.9		<7.8		13		16		<7.8		<3.9		<7.8		<7.8		<7.8		**4.7**		<7.8		<3.9		**32**	
		10/11/2006	<7.3		<7.3		<15		42		39		<15		<7.3		<15		<15		<15		<7.3		<15		<7.3		**69**	
		10/11/2006 (DUP)	<7		<7		<14		41		41		<14		<7		<14		<14		<14		**7.5**		<14		<7		**79**	
		4/30/2007	<0.53		**1.8**		**1.6**		17		17		<1.1		<0.53		<1.1		<1.1		7.9		**5.2**		<1.1		1.6		**58**	
		10/11/2007	<0.51		**1.4**		<1		22		20		<1		<0.51		<1		<1		<1		2.5		<1		<0.51		5.5	
		10/11/2007 (DUP)	<0.43		**1.7**		<0.86		23		18		0.99		<0.43		<0.86		<0.86		<0.86		2.3		<0.86		<0.43		7.1	
		5/8/2008	<0.49		**1**		<0.99		13		13		<0.99		<0.49		<0.99		<0.99		<0.99		1.7		<0.99		<0.49		**13**	
	MW124R	5/8/2008 (DUP)	<0.49		1.1		<0.99		14		13		<0.99		<0.49		<0.99		<0.99		<0.99		1.7		<0.99		<0.49		13	
		10/16/2008	<0.39		**0.84**		<0.78		15		13		<0.78		<0.39		<0.78		<0.78		<0.78		2.1		<0.78		<0.39		2.6	
		10/16/2008 (DUP)	<0.39		**0.8**		<0.78		13		12		<0.78		<0.39		<0.78		<0.78		<0.78		1.9		<0.78		<0.39		2.5	
		5/6/2009	<0.23		**1.1**		<0.44		17		14		<0.44		<0.23		<0.44		<0.44		<0.44		2.2		<0.55		<0.23		**21**	
		10/26/2009	<0.24		**0.65**		<0.46		13		10		<0.46		<0.24		0.27	F /	<0.46		0.35	F /	1		<0.58		<0.24		2.3	
		4/8/2010	<0.25		<0.49		<0.49		10		8.8		<0.49		<0.25		<0.49		<0.49		<0.49		1.1		<0.61		<0.25		1.6	
		4/8/2010 (DUP)	<0.21		**0.68**		<0.41		9.8		8.5		<0.41		<0.21		<0.41		<0.41		<0.41		1.1		<0.52		<0.21		1.6	
		11/3/2010	<0.29		<0.56		<0.56		0.87		0.7		<0.56		<0.29		<0.56		<0.56		<0.56		0.36		<0.71		<0.29		<0.29	
		4/20/2011	<0.20		0.11	F /	<0.38		3.2		3.1		<0.38		<0.20		<0.38		<0.38		<0.38		<0.20		<0.48		<0.20		<0.20	
		10/18/2011	<0.22		<0.22		<0.22		<0.42		<0.42		6	/ J	<0.22		<0.42		<0.42		<0.42		0.66	/ J	<0.53		<0.22		<0.22	
		10/18/2011 (DUP)	<0.25		<0.25		<0.25		<0.49		<0.49		6.9	/ J	<0.25		<0.49		<0.49		<0.49		0.65	/ J	<0.61		<0.25		<0.25	
		4/14/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/23/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/10/2013	<0.41	U / UJ	<0.41	U / UJ	<0.2	U / UJ	<0.2	U / UJ	<0.2	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<1	U / UJ	<0.2	U / UJ	<0.24	U / UJ	<1	U / UJ	<0.41	U / UJ
		10/17/2013	<0.42	U / UJ	<0.31	U / UJ	<0.21	U / UJ	<0.21	U / UJ	<0.21	U / UJ	<0.42	U / UJ	<0.42	U / UJ	<0.42	U / UJ	<0.42	U / UJ	<1	U / UJ	<0.21	U / UJ	<0.25	U / UJ	<1	U / UJ	<0.42	U / UJ
		10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	
		12/17/2014	<0.41		<0.41		<0.2		<0.2		<0.2		<0.41		<0.39		0.19	F /	<0.41		<0.98		<0.2		<0.24		<0.98		<0.39	

TABLE B1

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Joliet Army Ammunition Plant
Will County, Illinois

		Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[1]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
MFG	***Early Warning***																													
(M6)	MW162R	10/20/2004	<0.39		<0.39 (0.12)		<0.78 (0.14)		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW162R	7/13/2005	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW162R	10/20/2005	<0.63		<0.63		<1.3		<1.3		<1.3		<1.3		<0.63		<1.3		<1.3		<1.3		<0.63		<1.3		<0.63		<0.63	
	MW162R	5/3/2006	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW162R	10/11/2006	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW162R	4/25/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW162R	10/9/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW162R	5/1/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW162R	10/20/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW162R	5/6/2009	<0.22		<0.42		<0.42		<0.42		<0.42		<0.42		<0.22		<0.42		<0.42		<0.42		<0.22		<0.53		<0.22		<0.22	
	MW162R	10/26/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	MW162R	4/8/2010	<0.29		<0.57		<0.57		<0.57		<0.57		<0.57		<0.29		<0.57		<0.57		<0.57		<0.29		<0.72		<0.29		<0.29	
	MW162R	11/1/2010	<0.27		<0.52		<0.52		<0.52		<0.52		<0.52		<0.27		<0.52		<0.52		<0.52		<0.27		<0.65		<0.27		<0.27	
	MW162R	4/20/2011	<0.21		<0.41		<0.41		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.51		<0.21		<0.21	
	MW162R	10/18/2011	<0.41		<0.41		<0.41		<0.79		<0.79		<0.79		<0.41		<0.79		<0.79		<0.79		<0.41		<0.99		<0.41		<0.41	
	MW162R	10/18/2011 (DUP)	<0.33		<0.33		<0.33		<0.64		<0.64		<0.64		<0.33		<0.64		<0.64		<0.64		<0.33		<0.81		<0.33		<0.33	
	MW162R	4/14/2012	<0.16		0.27	F / J	0.14	F /	<0.31		<0.31		<0.31		<0.16		0.7		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	MW162R	10/23/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	MW162R	4/10/2013	<0.41		<0.41		<0.2		<0.2		<0.2		<0.41		<0.41		<0.41		<0.41		<1		<0.2		<0.24		<1		<0.41	U / UJ
	MW162R	10/17/2013	<0.41		<0.31		<0.21		<0.21		<0.21		<0.41		<0.41		<0.41		<0.41		<1		<0.21		<0.25		<1		<0.41	
	MW162R	10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
	MW162R	12/17/2014	<0.41		<0.39		<0.2		<0.21		<0.2		<0.39		<0.39		<0.39		<0.41		<0.98		<0.2		<0.25		<1		<0.41	
	MW313	10/22/2004	<0.39		<0.39 (0.12)		<0.78 (0.14)		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW313	7/19/2005	<0.63		<0.63		<1.3		<1.3		<1.3		<1.3		<0.63		<1.3		<1.3		<1.3		<0.63		<1.3		<0.63		<0.63	
	MW313	10/19/2005	<0.45		<0.45		<0.9		<0.9		<0.9		<0.9		<0.45		<0.9		<0.9		<0.9		<0.45		<0.9		<0.45		<0.45	
	MW313	5/2/2006	<0.58		<0.58		<1.2		<1.2		<1.2		<1.2		<0.58		<1.2		<1.2		<1.2		<0.58		<1.2		<0.58		<0.58	
	MW313	10/11/2006	<0.6		<0.6		<1.2		<1.2		<1.2		<1.2		<0.6		<1.2		<1.2		<1.2		<0.6		<1.2		<0.6		<0.6	
	MW313	4/30/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW313	10/10/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW313	5/7/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW313	10/16/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
	MW313	5/7/2009	<0.19		<0.37		<0.37		<0.37		<0.37		<0.37	U / UJ	<0.19		<0.37		<0.37		<0.37		<0.19		<0.46		<0.19		<0.19	
	MW313	5/7/2009 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31	U / UJ	<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	MW313	10/26/2009	<0.2		<0.39		<0.39		<0.39		<0.39		<0.39		<0.2		0.63		<0.39		0.27	F /	<0.2		<0.49		<0.2		<0.2	
	MW313	10/26/2009 (DUP)	<0.19		<0.36		<0.36		<0.36		<0.36		<0.36		<0.19		<0.36		<0.36		<0.36		<0.19		<0.46		<0.19		<0.19	
	MW313	4/9/2010	<0.29		<0.56		<0.56		<0.56		<0.56		<0.56		<0.29		<0.56		<0.56		<0.56		<0.29		<0.71		<0.29		<0.29	
	MW313	11/2/2010	<0.20		<0.38		<0.38		<0.38		<0.38		<0.38		<0.20		<0.38		<0.38		<0.38		<0.20		<0.48		<0.20		<0.20	
	MW313	11/2/2010 (DUP)	<0.38		<0.73		<0.73		<0.73		<0.73		<0.73		<0.38		<0.73		<0.73		<0.73		<0.38		<0.92		<0.38		<0.38	
	MW313	4/21/2011	<0.20		<0.38		<0.38		<0.38		<0.38		<0.38		<0.20		<0.38		<0.38		<0.38		<0.20		<0.48	U / UJ	<0.20		<0.20	
	MW313	10/19/2011	<0.36		<0.36		<0.36		<0.70		<0.70		<0.70		<0.36		<0.70		<0.70		<0.70		<0.36		<0.88		<0.36		<0.36	
	MW313	4/15/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
	MW313	10/23/2012	<1.6		**5**		**3.3**	/ J	<3.1		<3.1		<3.1		<1.6		44		<3.1		28		<1.6		<3.9		<1.6		<1.6	
	MW313	4/11/2013	<0.36		<0.36		<0.18		<0.18		<0.18		<0.36		<0.36		<0.36		<0.36		<0.91		0.061	F / J	<0.22		<0.91		<0.36	
	MW313	10/17/2013	<0.42		<0.31		<0.21		<0.21		<0.21		<0.42		<0.42		<0.42		<0.42		<1		<0.21		<0.25		<1		<0.42	
	MW313	10/22/2014	<0.39		<0.39		<0.2		<0.2		<0.2		<0.39		<0.39		0.88		<0.39		0.53	F /	<0.2		<0.24	U / UJ	<0.98		<0.39	
	MW313	12/18/2014	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		0.44		<0.4		0.2	F /	<0.2		<0.24		<0.97		<0.39	

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well	Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit(1)	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
MFG		***Early Warning***																												
(M6)	MW318	10/21/2004	<2		<2 (0.61)		**6.7**	/ J	<3.9		<3.9		<3.9		<2		<3.9		<3.9		<3.9		<2		<3.9		<2		<2	
		7/13/2005	<0.55		<0.55		<1.1		<1.1		<1.1		<1.1		<0.55		<1.1		<1.1		<1.1		<0.55		<1.1		<0.55		<0.55	
		7/13/2005 (DUP)	<0.55		<0.55		<1.1		<1.1		<1.1		<1.1		<0.55		<1.1		<1.1		<1.1		<0.55		<1.1		<0.55		<0.55	
		10/18/2005	<0.44		<0.44		<0.88		<0.88		<0.88		<0.88		<0.44		<0.88		<0.88		<0.88		<0.44		<0.88		<0.44		<0.44	
		10/18/2005 (DUP)	<0.44		<0.44		<0.87		<0.87		<0.87		<0.87		<0.44		<0.87		<0.87		<0.87		<0.44		<0.87		<0.44		<0.44	
		5/2/2006	<0.78		<0.78		<1.6		<1.6		<1.6		3.4		<0.78		<1.6		<1.6		<1.6		<0.78		<1.6		<0.78		<0.78	
		5/2/2006 (DUP)	<0.78		<0.78		<1.6		<1.6		<1.6		4.1		<0.78		<1.6		<1.6		<1.6		<0.78		<1.6		<0.78		<0.78	
		10/10/2006	<0.47		<0.47		<0.95		<0.95		<0.95		<0.95		<0.47		<0.95		4.4		<0.95		<0.47		<0.95		<0.47		<0.47	
		10/10/2006 (DUP)	<0.4		<0.4		<0.79		<0.79		<0.79		<0.79		<0.4		<0.79		2.8		<0.79		<0.4		<0.79		<0.4		<0.4	
		4/23/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/9/2007	<0.51		<0.51		<1		<1		<1		<1		<0.51		<1		<1		<1		<0.51		<1		<0.51		<0.51	
		5/7/2008	<0.94		<0.94		<1.9		<1.9		<1.9		<1.9		<0.94		<1.9		<1.9		<1.9		<0.94		<1.9		<0.94		<0.94	
		10/14/2008	<0.78		<0.78		<1.6		<1.6		<1.6		<1.6		<0.78		<1.6		<1.6		<1.6		**4.4**		<1.6		<0.78		<0.78	
		5/6/2009	<0.16	U / UJ	<0.31	U / UJ	<0.31	U / UJ	<0.31	U / UJ	<0.31	U / UJ	<0.31	U / UJ	<0.16	U / UJ	<0.31	U / UJ	<0.31	U / UJ	<0.31	U / UJ	<0.16	U / UJ	<0.39	U / UJ	<0.16	U / UJ	<0.16	U / UJ
		10/26/2009	<0.83		<1.6		<1.6		<1.6		<1.6		<1.6		<0.83		<1.6		<1.6		<1.6		<0.83		<2		<0.83		<0.83	
		4/8/2010	<0.21		<0.41		<0.41		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.52		<0.21		<0.21	
		11/2/2010	<0.36		<0.70		<0.70		<0.70		<0.70		<0.70		<0.36		<0.70		<0.70		<0.70		<0.36		<0.88		<0.36		<0.36	
		4/21/2011	<0.29		<0.56		<0.56		<0.56		<0.56		<0.56		<0.29		0.85		<0.56		<0.56		<0.29		<0.71		<0.29		<0.29	
		10/19/2011	<0.95		<0.95		**2.8**	/ NJ	<1.8		<1.8		<1.8		<0.95		<1.8		<1.8		<1.8		<0.95		<2.3		<0.95		2.9	/ J
		4/14/2012	<0.32		0.21	F / J	**0.45**	F / J	<0.62		<0.62		<0.62		<0.32		<0.62		<0.62		<0.62		<0.32		<0.78		<0.32		<0.32	
		10/23/2012	<0.8		<1.6		<1.6		<1.6		<1.6		<1.6		<0.8		<1.6		<1.6		<1.6		<0.8		<2		<0.8		<0.8	
		4/10/2013	<0.37	U / UJ	<0.37	U / UJ	**0.79**	/ J	<0.19	U / UJ	<0.19	U / UJ	16	/ JJ	<0.37	U / UJ	<0.37	U / UJ	<0.37	U / UJ	<0.94	U / UJ	<0.19	U / UJ	<0.22	U / UJ	2.4	/ JJ	<0.37	U / UJ
		10/17/2013	5.8	/ J	<0.31	U / UJ	**0.54**	/ J	1.4	/ J	<0.21	U / UJ	<0.42	U / UJ	<0.42	U / J	<0.42	U / UJ	<0.42	U / UJ	<1	U / UJ	<0.21	U / UJ	<0.25	U / UJ	<1	U / UJ	<0.42	U / UJ
		10/21/2014	1.8	/ J	<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		0.64	/ J	<0.24	U / UJ	<1		<0.4	
		12/17/2014	1.6		0.2	F /	<0.2		1.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
	MW319	10/21/2004	<2.7		<2.7 (0.83)		<5.3 (0.98)		<5.3		<5.3		<5.3		<2.7		<5.3		<5.3		<5.3		<2.7		<5.3		<2.7		<2.7	
		7/13/2005	<0.49		<0.49		<0.99		<0.99		<0.99		<0.99		<0.49		<0.99		<0.99		<0.99		<0.49		<0.99		<0.49		<0.49	
		10/18/2005	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/2/2006	<0.78		<0.78		<1.6		<1.6		<1.6		8.9		<0.78		<1.6		<1.6		<1.6		<0.78		<1.6		<0.78		<0.78	
		10/10/2006	<0.43		<0.43		**11**		<0.86		<0.86		<0.86		<0.43		<0.86		6.7		<0.86		<0.43		<0.86		<0.43		<0.43	
		4/23/2007	<0.41		<0.41		**2**		<0.82		<0.82		<0.82		<0.41		<0.82		<0.82		<0.82		<0.41		<0.82		<0.41		<0.41	
		10/9/2007	<0.67		<0.67		<1.3		<1.3		<1.3		<1.3		<0.67		<1.3		<1.3		<1.3		<0.67		<1.3		<0.67		<0.67	
		5/7/2008	<2		<2		<4		<4		<4		<4		<2		<4		<4		<4		<2		<4		<2		<2	
		10/14/2008	<0.83		<0.83		<1.7		<1.7		<1.7		<1.7		<0.83		<1.7		<1.7		<1.7		**12**		<1.7		<0.83		<0.83	
		5/6/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/26/2009	<0.8		<1.6		<1.6		<1.6		<1.6		<1.6		<0.8		<1.6		<1.6		<1.6		<0.8		<2		<0.8		<0.8	
		4/8/2010	<0.25		<0.49		**3**		<0.49		<0.49		<0.49		<0.25		<0.49		<0.49		<0.49		<0.25		<0.62		<0.25		<0.25	
		11/2/2010	<0.19		**6.2**	/ J	<0.36		<0.36		<0.36		<0.36		<0.19		0.85	/ J	<0.36		<0.36		<0.19		<0.46		<0.19		<0.19	
		4/21/2011	<0.18		**0.74**		<0.35		<0.35		<0.35		<0.35		<0.18		<0.35		<0.35		<0.35		<0.18		<0.44		<0.18		<0.18	
		10/19/2011	<0.87		<0.87		<0.87		<1.7		<1.7		<1.7		<0.87		<1.7		<1.7		<1.7		<0.87		<2.1		<0.87		5.8	/ J
		4/14/2012	<0.32		<0.62		<0.62		<0.62		<0.62		<0.62		<0.32		<0.62		<0.62		<0.62		<0.32		<0.78		<0.32		0.29	F / J
		10/23/2012	<0.8		<1.6		<1.6		<1.6		<1.6		<1.6		<0.8		<1.6		<1.6		<1.6		<0.8		<2		<0.8		<0.8	
		4/10/2013	<0.4		<0.4		<0.2		6.2		<0.2		57	/ JJ	<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
		10/17/2013	<0.42		<0.32		**2.8**	/ J	<0.21		<0.21		<0.42		1.5	/ J	<0.42		<0.42		<1.1		<0.21		<0.25		<1.1		<0.42	
		10/21/2014	<0.4	U / UJ	<0.4		<0.2		0.74	/ J	<0.2		<0.4		0.64	/ J	<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1	U / UJ	<0.4	
		12/17/2014	<0.39		<0.39		<0.2		<0.21		<0.21		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24		<0.98		<0.39	
	MW654	10/22/2004	<0.4		**3**		**1.9**		1.6		2		<0.81		<0.4		3.3		<0.81		1.8		<0.4		<0.81		<0.4		<0.4	
		7/13/2005	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/18/2005	<0.39		**0.55**		<0.78		<0.78		0.85		<0.78		<0.39		1.1		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/2/2006	<0.39		<0.39		<0.78		<0.78		0.88		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/6/2006	<0.46		**1.2**		<0.91		<0.91		1.2		<0.91		<0.46		1.3		<0.91		<0.91		<0.46		<0.91		<0.46		<0.46	
		4/24/2007	<0.39		**0.95**		<0.78		1.7		3.2		<0.78		<0.39		1.2		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/10/2007	<0.44		<0.44		<0.87		1.6		3		<0.87		<0.44		<0.87		<0.87		<0.87		**3.4**		<0.87		<0.44		<0.44	
		5/6/2008	<0.47		<0.47		<0.94		1.4		2.6		<0.94		<0.47		<0.94		<0.94		<0.94		0.55		<0.94		<0.47		<0.47	
		10/16/2008	<0.66		<0.66		<1.3		<1.3		<1.3		<1.3		<0.66		<1.3		<1.3		<1.3		<0.66		<1.3		<0.66		<0.66	
		10/16/2008 (DUP)	<0.39		<0.39		<0.78		<0.78		1.7		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/7/2009	<0.16		<0.31		<0.31		2.2		5.8		<0.31	U / UJ	<0.16		<0.31		<0.31		<0.31		0.7		<0.39		<0.16		<0.16	
		10/26/2009	<0.21		**0.63**		0.25	F /	0.36	F /	0.69		<0.41		<0.21		1.6		<0.41		0.58		<0.21		<0.52		<0.21		<0.21	
		4/9/2010	<0.26		<0.51		<0.51		1.3		4.4		<0.51		<0.26		<0.51		<0.51		<0.51		0.7		<0.64		<0.26		<0.26	
		11/2/2010	<0.16		0.084	F /	0.1	F /	0.19	F /	1		<0.31		<0.16		0.7		<0.31		0.25	F /	<0.16		<0.39	U / UJ	<0.16		<0.16	
		4/21/2011	<0.20		<0.38		<0.38		0.81		3		<0.38		<0.20		0.35	F /	<0.38		<0.38		<0.20		<0.48	U / UJ	<0.20		<0.20	
		10/19/2011	<0.20		<0.20		<0.20		<0.38		<0.38		<0.38		<0.20		<0.38		<0.38		<0.38		<0.20		<0.48		<0.20		<0.20	
		4/15/2012	<0.16		**1.7**		**0.97**		0.7		2.2		<0.31		<0.16		18		0.23	F / J	11		0.31	/ J	<0.39		<0.16		0.18	/ J
		10/23/2012	<1.6		**8.9**		**4.8**		<3.1		<3.1		<3.1		<1.6		86		<3.1		52		<1.6		<3.9		<1.6		<1.6	
		4/11/2013	<0.38	U / UJ	0.085	F / JJ	0.11	F / JJ	0.76	/ J	0.82	/ JJ	<0.38	U / UJ	<0.38	U / UJ	0.23	F / J	<0.38	U / UJ	<0.95	U / UJ	0.15	F / JJ	<0.23	U / UJ	0.32	F / JJ	<0.38	U / UJ
		10/17/2013	<0.41		0.12	F / J	<0.21		0.41		0.54	/ J	<0.41		<0.41		0.31	F / J	<0.41		<1		<0.21		<0.25		<1		<0.41	
		10/22/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
		12/18/2014	<0.4		<0.4		<0.2		0.08	F / J	<0.2		<0.4		<0.41		0.22	F /	<0.41		<1		<0.2		<0.24		<1		<0.4	

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit(1)	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
MFG		***Compliance***																												
(Other Areas)	MW117	10/19/2004	<0.64		<0.64 (0.2)		<1.3 (0.23)		<1.3		<1.3		<1.3		<0.64		<1.3		<1.3		<1.3		<0.64		<1.3		<0.64		<0.64	
		7/14/2005	<0.44		<0.44		<0.87		<0.87		<0.87		<0.87		<0.44		<0.87		<0.87		<0.87		<0.44		<0.87		<0.44		<0.44	
		10/20/2005	<0.58		<0.58		<1.2		<1.2		<1.2		<1.2		<0.58		<1.2		<1.2		<1.2		<0.58		<1.2		<0.58		<0.58	
		5/3/2006	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/11/2006	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		4/30/2007	<0.43		<0.43		<0.86		<0.86		<0.86		<0.86		<0.43		<0.86		<0.86		<0.86		<0.43		<0.86		<0.43		<0.43	
		10/11/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/9/2008	<0.44		<0.44		<0.87		<0.87		<0.87		<0.87		<0.44		1.4		<0.87		<0.87		<0.44		<0.87		<0.44		<0.44	
		5/8/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		5/8/2009 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/22/2009	<0.18		<0.35		<0.35		<0.35		<0.35		<0.35		<0.18		<0.35		<0.35		<0.35		<0.18		<0.44		<0.18		<0.18	
		4/8/2010	<0.22		<0.43		<0.43		<0.43		<0.43		<0.43		<0.22		<0.43		<0.43		<0.43		<0.22		<0.54		<0.22		<0.22	
		11/1/2010	<0.21		<0.41		<0.41		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.51		<0.21		<0.21	
		11/1/2010 (DUP)	<0.21		<0.41		<0.41		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.52		<0.21		<0.21	
		4/20/2011	<0.20		<0.39		<0.39		<0.39		<0.39		<0.39		<0.20		<0.39		<0.39		<0.39		<0.20		<0.49		<0.20		<0.20	
		4/20/2011 (DUP)	<0.17		<0.33		<0.33		<0.33		<0.33		<0.33		<0.17		<0.33		<0.33		<0.33		<0.17		<0.42		<0.17		<0.17	
		10/17/2011	<0.40		<0.40		<0.40		<0.77		<0.77		<0.77		<0.40		<0.77		<0.77		<0.77		<0.40		<0.97		<0.40		<0.40	U / UJ
		4/13/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31	U / UJ	<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/23/2012	<1.6	U / UJ	**2.6**	F / J	<3.1	U / UJ	<3.1	U / UJ	<3.1	U / UJ	<3.1	U / UJ	<1.6	U / UJ	24	/ J	<3.1	U / UJ	16	/ J	<1.6	U / UJ	<3.9	U / UJ	<1.6	U / UJ	<1.6	U / UJ
		4/10/2013	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
		10/17/2013	<0.43	U / UJ	<0.32	U / UJ	<0.21	U / UJ	<0.21	U / UJ	<0.21	U / UJ	<0.43	U / UJ	<0.43		0.41	F / J	<0.43	U / UJ	<1.1	U / UJ	<0.21	U / UJ	<0.26	U / UJ	<1.1	U / UJ	<0.43	
		10/27/2014	<0.39		<0.39		<0.2		<0.2		<0.2		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24	U / UJ	<0.98		<0.39	
		12/15/2014	<0.39		<0.39		<0.2		<0.2		<0.2		<0.39		<0.39		<0.39		<0.39		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.39	
	MW118	10/22/2004	<0.48		<0.48 (0.15)		<0.96 (0.18)		<0.96		<0.96		<0.96		<0.48		<0.96		<0.96		<0.96		<0.48		<0.96		<0.48		<0.48	
		7/13/2005	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		0.77	U /
		10/19/2005	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/3/2006	<0.52		<0.52		<1		<1		<1		<1		<0.52		<1		<1		<1		<0.52		<1		<0.52		<0.52	
		10/11/2006	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		4/30/2007	<0.4		<0.4		<0.81		<0.81		<0.81		<0.81		<0.4		<0.81		<0.81		<0.81		<0.4		<0.81		<0.4		<0.4	
		10/12/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/6/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/20/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/8/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/22/2009	<0.18		<0.34		<0.34		<0.34		<0.34		<0.34		<0.18		<0.34		<0.34		<0.34		<0.18		<0.43		<0.18		<0.18	
		4/8/2010	<0.23		<0.44		<0.44		<0.44		<0.44		<0.44		<0.23		<0.44		<0.44		<0.44		<0.23		<0.56		<0.23		<0.23	
		11/2/2010	<0.22		<0.43		<0.43		<0.43		<0.43		<0.43		<0.22		<0.43		<0.43		<0.43		<0.22		<0.55		<0.22		<0.22	
		4/20/2011	<0.18		<0.35		<0.35		<0.35		<0.35		<0.35		<0.18		<0.35		<0.35		<0.35		<0.18		<0.44		<0.18		<0.18	
		10/17/2011	<0.33		<0.33		<0.33		<0.65		<0.65		<0.65		<0.33		<0.65		<0.65		<0.65		<0.33		<0.81		<0.33		<0.33	U / UJ
		4/13/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31	U / UJ	<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/23/2012	<1.6	U / UJ	**2.3**	F / J	<3.1	U / UJ	<3.1	U / UJ	<3.1	U / UJ	<3.1	U / UJ	<1.6	U / UJ	20	/ J	<3.1	U / UJ	15	/ J	<1.6	U / UJ	<3.9	U / UJ	<1.6	U / UJ	<1.6	U / UJ
		4/10/2013	<0.41		<0.41		<0.21		<0.21		<0.21		<0.41		<0.41		<0.41		<0.41		<1		<0.21		<0.25		<1		<0.41	
		10/17/2013	<0.43		<0.32		<0.21		<0.21		<0.21		<0.43		<0.43		1	/ J	<0.43		0.52	F / J	<0.21		<0.26		<1.1		<0.43	
		10/27/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
		12/15/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
	MW119	10/22/2004	<0.39		<0.39 (0.12)		<0.78 (0.14)		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		7/18/2005	<0.57		<0.57		<1.1		<1.1		<1.1		<1.1		<0.57		<1.1		<1.1		<1.1		<0.57		<1.1		<0.57		<0.57	
		10/21/2005	<0.52		<0.52		<1		<1		<1		<1		<0.52		<1		<1		<1		<0.52		<1		<0.52		<0.52	
		5/3/2006	<0.44		<0.44		<0.87		<0.87		<0.87		<0.87		<0.44		<0.87		<0.87		<0.87		<0.44		<0.87		<0.44		<0.44	
		10/9/2006	<0.49		<0.49		<0.99		<0.99		<0.99		<0.99		<0.49		<0.99		<0.99		<0.99		<0.49		<0.99		<0.49		<0.49	
		4/30/2007	<0.6		<0.6		<1.2		<1.2		<1.2		<1.2		<0.6		<1.2		<1.2		<1.2		<0.6		<1.2		<0.6		<0.6	
		10/10/2007	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/10/2007 (DUP)	<0.4		<0.4		<0.81		<0.81		<0.81		<0.81		<0.4		<0.81		<0.81		<0.81		<0.4		<0.81		<0.4		<0.4	
		5/6/2008	<0.72		<0.72		<1.4		<1.4		<1.4		<1.4		<0.72		<1.4		<1.4		<1.4		<0.72		<1.4		<0.72		<0.72	
		10/15/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/7/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31	U / UJ	<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/22/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/8/2010	<0.17		<0.33		<0.33		<0.33		<0.33		<0.33		<0.17		<0.33		<0.33		<0.33		<0.17		<0.42		<0.17		<0.17	
		11/2/2010	<0.22		<0.43		<0.43		<0.43		<0.43		<0.43		<0.22		<0.43		<0.43		<0.43		<0.22		<0.55		<0.22		<0.22	
		4/20/2011	<0.20		<0.39		<0.39		<0.39		<0.39		<0.39		<0.20		<0.39		<0.39		<0.39		<0.20		<0.49		<0.20		<0.20	
		10/17/2011	<0.41		<0.41		<0.41		<0.80		<0.80		<0.80		<0.41		<0.80		<0.80		<0.80		<0.41		<1.0		<0.41		<0.41	U / UJ
		4/13/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31	U / UJ	<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/23/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/10/2013	<0.41		<0.41		<0.2		<0.2		<0.2		<0.41		<0.41		<0.41		<0.41		<1		<0.2		<0.25		<1		<0.41	
		10/17/2013	<0.43		<0.32		<0.21		<0.21		<0.21		<0.43		<0.43		0.11	F / J	<0.43		<1.1		<0.21		<0.26		<1.1		<0.43	
		10/27/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.96		<0.19		<0.23	U / UJ	<0.96		<0.39	
		12/17/2014	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13	***Upgradient***																													
	MW806	5/15/2008	<0.56		<0.56		<1.1		<1.1		<1.1		<1.1		<0.56		<1.1		<1.1		<1.1		<0.56		<1.1		<0.56		<0.56	
		8/19/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/21/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		2/4/2009	<0.20		<0.38		<0.38		<0.38		<0.38		<0.38		<0.20		<0.38		<0.38		<0.38		<0.20		<0.48		<0.20		<0.20	
		5/5/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/29/2009	<0.2		<0.38		<0.38		<0.38		<0.38		<0.38		<0.2		<0.38		<0.38		<0.38		<0.2		<0.48		<0.2		<0.2	
		10/28/2009	<0.19		<0.37		<0.37		<0.37		<0.37		<0.37		<0.19		<0.37		<0.37		<0.37		<0.19		<0.46		<0.19		<0.19	
		1/15/2010	<0.19		<0.36		<0.36		<0.36		<0.36		<0.36		<0.19		<0.36		<0.36		<0.36		<0.19		<0.46		<0.19		<0.19	
		4/14/2010	<0.20		<0.38		<0.38		<0.38		<0.38		<0.38		<0.20		<0.38		<0.38		<0.38		<0.20		<0.48		<0.20		<0.20	
		7/21/2010	<0.27		<0.52		<0.52		<0.52		<0.52		<0.52		<0.27		<0.52		<0.52		<0.52		<0.27		<0.65		<0.27		<0.27	
		10/28/2010	<0.25		<0.49		<0.49		<0.49		<0.49		<0.49		<0.25		<0.49		<0.49		<0.49		<0.25		<0.62		<0.25		<0.25	
		1/27/2011	<0.25		<0.49		<0.49		<0.49		<0.49		<0.49		<0.25		<0.49		<0.49		<0.49		<0.25		<0.62		<0.25		<0.25	
		4/19/2011	<0.24		<0.47		<0.47		<0.47		<0.47		<0.47		<0.24		<0.47		<0.47		<0.47		<0.24		<0.59		<0.24		<0.24	
		7/28/2011	<0.22		<0.22		<0.22		<0.42		<0.42		<0.42		<0.22		<0.42		<0.42		<0.42		<0.22		<0.53		<0.22		<0.22	
		10/12/2011	<0.31		<0.31		<0.31		<0.61		<0.61		<0.61		<0.31		<0.61		<0.61		<0.61		<0.31		<0.77		<0.31		<0.31	U / UJ
		2/29/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/17/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/24/2012	<0.16		**1.4**		**0.96**		<0.31		<0.31		<0.31		<0.16		5.5		<0.31		5		<0.16		<0.39		<0.16		<0.16	
		1/31/2013	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
		1/31/2013 (DUP)	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
		4/9/2013	<0.45		<0.45		<0.22		<0.22		<0.22		<0.45		<0.45		<0.45		<0.45		<1.1		<0.22		<0.27		<1.1		<0.45	
		7/31/2013	<0.4		<0.3		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
		10/15/2013	<0.36		<0.27		<0.18		<0.18		<0.18		<0.36		<0.36		<0.36		<0.36		<0.91		<0.18		<0.22		<0.91		<0.36	
		10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		11/19/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.96		<0.19		<0.23		<0.96		<0.38	
		12/16/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
	MW807	5/15/2008	<0.41		<0.41		<0.82		<0.82		<0.82		<0.82		<0.41		<0.82		<0.82		<0.82		<0.41		<0.82		<0.41		<0.41	
		5/15/2008 (DUP)	<0.83		<0.83		<1.7		<1.7		<1.7		<1.7		<0.83		<1.7		<1.7		<1.7		<0.83		<1.7		<0.83		<0.83	
		8/19/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		8/19/2008 (DUP)	<0.41		<0.41		<0.82		<0.82		<0.82		<0.82		<0.41		<0.82		<0.82		<0.82		<0.41		<0.82		<0.41		<0.41	
		10/21/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		2/4/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		5/5/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/29/2009	<0.21		<0.41		<0.41		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.51		<0.21		<0.21	
		10/28/2009	<0.22		<0.42		<0.42		<0.42		<0.42		<0.42		<0.22		<0.42		<0.42		<0.42		<0.22		<0.53		<0.22		<0.22	
		1/15/2010	<0.32		<0.61		<0.61		<0.61		<0.61		<0.61		<0.32		<0.61		<0.61		<0.61		<0.32		<0.77		<0.32		<0.32	
		4/14/2010	<0.17		<0.34		<0.34		<0.34		<0.34		<0.34		<0.17		<0.34		<0.34		<0.34		<0.17		<0.42		<0.17		<0.17	
		7/21/2010	<0.20		<0.39		<0.39		<0.39		<0.39		<0.39		<0.20		<0.39		<0.39		<0.39		<0.20		<0.49		<0.20		<0.20	
		10/28/2010	<0.21		<0.40		<0.40		<0.40		<0.40		<0.40		<0.21		<0.40		<0.40		<0.40		<0.21		<0.50		<0.21		<0.21	
		1/27/2011	<0.25		<0.48		<0.48		<0.48		<0.48		<0.48		<0.25		<0.48		<0.48		<0.48		<0.25		<0.60		<0.25		<0.25	
		4/19/2011	<0.22		<0.42		<0.42		<0.42		<0.42		<0.42		<0.22		<0.42		<0.42		<0.42		<0.22		<0.53		<0.22		<0.22	
		7/28/2011	<0.22		<0.22		<0.22		<0.42		<0.42		<0.42		<0.22		<0.42		<0.42		<0.42		<0.22		<0.53	U / UJ	<0.22		<0.22	
		10/12/2011	<0.23		<0.23		<0.23		<0.44		<0.44		<0.44		<0.23		<0.44		<0.44		<0.44		<0.23		<0.55		<0.23		<0.23	
		2/29/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	U / UJ
		7/17/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/24/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		1/31/2013	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
		4/9/2013	<0.41	U / UJ	<0.41	U / UJ	<0.2	U / UJ	<0.2	U / UJ	<0.2	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<1	U / UJ	<0.2	U / UJ	<0.24	U / UJ	<1	U / UJ	<0.41	U / UJ
		7/31/2013	<0.41		<0.31		<0.2		<0.2		<0.2		<0.41		<0.41		<0.41		<0.41		<1		<0.2		<0.24		<1		<0.41	
		10/15/2013	<0.36		<0.27		<0.18		<0.18		<0.18		<0.36		<0.36		<0.36		<0.36		<0.91		<0.18		<0.22		<0.91		<0.36	
		10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		11/19/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24		<0.99		<0.4	
		12/16/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.96		<0.19		<0.23	U / UJ	<0.96		<0.38	

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**1,3-DNB**		**2,4-DNT**		**2,6-DNT**		**2-A-4,6-DNT**		**4-A-2,6-DNT**		**HMX**		**NB**		**2-NT**		**3-NT**		**4-NT**		**RDX**		**Tetryl**		**1,3,5-TNB**		**2,4,6-TNT**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13	***Downgradient***																													
	MW126R	5/20/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		8/20/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/22/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		2/5/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		5/5/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/28/2009	<0.26		<0.51		<0.51		<0.51		<0.51		<0.51		<0.26		<0.51		<0.51		<0.51		<0.26		<0.64		<0.26		<0.26	
		10/29/2009	<0.23		<0.45		<0.45		<0.45		<0.45		<0.45		<0.23		<0.45		<0.45		<0.45		<0.23		<0.57		<0.23		<0.23	
		1/14/2010	<0.29		<0.55		<0.55		<0.55		<0.55		<0.55		<0.29		<0.55		<0.55		<0.55		<0.29		<0.70		<0.29		<0.29	
		4/14/2010	<0.20		<0.39		<0.39		<0.39		<0.39		<0.39		<0.20		<0.39		<0.39		<0.39		<0.20		<0.49		<0.20		<0.20	
		4/14/2010 (DUP)	<0.51		<0.98		<0.98		<0.98		<0.98		<0.98		<0.51		<0.98		<0.98		<0.98		<0.51		<1.2		<0.51		<0.51	
		7/20/2010	<0.21		<0.41		<0.41		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.51		<0.21		<0.21	
		10/28/2010	<0.22		<0.43		<0.43		<0.43		<0.43		<0.43		<0.22		<0.43		<0.43		<0.43		<0.22		<0.54		<0.22		<0.22	
		1/28/2011	<0.27		<0.52		<0.52		<0.52		<0.52		<0.52		<0.27		<0.52		<0.52		<0.52		<0.27		<0.65		<0.27		<0.27	
		4/19/2011	<0.46		<0.90		<0.90		<0.90		<0.90		<0.90		<0.46		<0.90		<0.90		<0.90		<0.46		<1.1		<0.46		<0.46	
		7/28/2011	<0.28		<0.28		<0.28		<0.54		<0.54		<0.54		<0.28		<0.54		<0.54		<0.54		<0.28		<0.68	U / UJ	<0.28		<0.28	
		10/13/2011	<0.31		<0.31		<0.31		<0.61		<0.61		<0.61		<0.31		<0.61		<0.61		<0.61		<0.31		<0.77		<0.31		<0.31	
		2/29/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		0.35		<0.31		0.3	F /	<0.16		<0.39		<0.16		<0.16	
		7/17/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/25/2012	<0.16		**1.1**		**0.62**		<0.31		<0.31		<0.31		<0.16		2.1		0.17	F / J	2.4		<0.16		<0.39		0.22		<0.16	
		1/30/2013	<0.41		<0.41		<0.2		<0.2		<0.2		<0.41		<0.41		<0.41		<0.41		<1		<0.2		<0.24		<1		<0.41	
		4/9/2013	<0.41	U / UJ	<0.41	U / UJ	<0.2	U / UJ	<0.2	U / UJ	<0.2	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<1	U / UJ	<0.2	U / UJ	<0.24	U / UJ	<1	U / UJ	<0.41	U / UJ
		7/31/2013	<0.4		<0.3		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24		<0.99		<0.4	
		10/15/2013	<0.37		<0.28		<0.19		<0.19		<0.19		<0.37		<0.37		<0.37		<0.37		<0.93		<0.19		<0.22		<0.93		<0.37	
		10/21/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	
		11/19/2014	<0.39		<0.39		<0.19		<0.19	U / UJ	<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23		<0.97		<0.39	
		12/16/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
	MW362	5/13/2008	<0.45		<0.45		<0.9		1.3		1.1		<0.9		<0.45		<0.9		<0.9		<0.9		<0.45		<0.9		<0.45		<0.45	
		8/20/2008	<0.44		<0.44		<0.88		<0.88		<0.88		<0.88		<0.44		<0.88		<0.88		<0.88		<0.44		<0.88		<0.44		<0.44	
		10/22/2008	<0.39		**0.55**		<0.78		1.1		0.91		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		2/5/2009	<0.16		**7.1**		<0.31		1.5		1.2		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		5/5/2009	<0.16		<0.31		<0.31		0.94		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/28/2009	<0.17		<0.33		<0.33		<0.33		<0.33		<0.33		<0.17		<0.33		<0.33		<0.33		<0.17		<0.42		<0.17		<0.17	
		10/29/2009	<0.17		**4.3**		0.42		0.96		0.75		<0.34		<0.17		<0.34		<0.34		<0.34		<0.17		<0.42		<0.17		<0.17	
		1/14/2010	<0.30		**6.5**		<0.58		1.4		1.1		<0.58		<0.30		<0.58		<0.58		<0.58		<0.30		<0.73		<0.30		<0.30	
		1/14/2010 (DUP)	<0.19		**6.4**		<0.37		1.3		1.1		<0.37		<0.19		<0.37		<0.37		<0.37		<0.19		<0.47		<0.19		<0.19	
		4/14/2010	<0.24		**5**		<0.47		1.6		1.3		<0.47		<0.24		<0.47		<0.47		<0.47		<0.24		<0.59		<0.24		<0.24	
		7/20/2010	<0.22		**3.3**		<0.42		1.6		1.3		<0.42		<0.22		<0.42		<0.42		<0.42		<0.22		<0.53		<0.22		<0.22	
		10/28/2010	<0.25		**7.2**		<0.48		1.7		1.3		<0.48		<0.25		<0.48		<0.48		<0.48		<0.25		<0.60		<0.25		<0.25	
		1/28/2011	<0.23		**7.5**		**0.78**		1.9		1.7		<0.44		<0.23		<0.44		<0.44		<0.44		<0.23		<0.56		<0.23		<0.23	
		4/19/2011	<0.18		**3.2**		**1.2**		1.7		1.4		<0.34		<0.18		<0.34		<0.34		<0.34		<0.18		<0.43		<0.18		<0.18	
		7/28/2011	<0.44		**3.3**		**0.65**		1.4		1.2		<0.85		<0.44		<0.85		<0.85		<0.85		**4.8**		<1.1	U / UJ	<0.44		<0.44	
		10/13/2011	<0.26		**2.9**		0.36		<0.51		<0.51		<0.51		<0.26		<0.51		<0.51		<0.51		<0.26		<0.64		<0.26		<0.26	
		2/29/2012	<0.16		**1.5**		<0.31		0.83		0.78		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2012	<0.16		**4.9**		<0.31		1.2		1.1		<0.31		<0.16		0.24	F / J	<0.31		<0.31	U / UJ	<0.16		<0.39		<0.16		0.073	F /
		4/16/2012 (DUP)	<0.16		**5.4**		<0.31		1.2		1		<0.31		<0.16		2	/ J	0.19	F /	1.9	/ J	<0.16		<0.39		<0.16		0.097	F /
		7/17/2012	<0.16		**3.6**		**0.68**		1.6		1.3		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/25/2012	<0.16		**6.7**		**1**		1.4		0.97		<0.31		<0.16		1.6		0.16	F /	1.9		**13**		<0.39		<0.16		0.08	F /
		1/30/2013	<0.41	U / UJ	**7.3**	/ J	0.33	/ J	1.2	/ J	0.97	/ J	<0.41	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<1	U / UJ	<0.21	U / UJ	<0.25	U / UJ	<1	U / UJ	<0.41	U / UJ
		4/9/2013	<0.4	U / UJ	**3.9**	/ J	0.26	/ JJ	0.82	/ JJ	0.61	/ JJ	<0.4	U / UJ	<0.4	U / UJ	<0.4	U / UJ	<0.4	U / UJ	<1	U / UJ	<0.2	U / UJ	<0.24	U / UJ	2.5	/ UJ	<0.4	U / UJ
		4/9/2013 (DUP)	<0.41		**3.6**		0.25	/ J	0.78		0.6	/ J	<0.41		<0.41		<0.41		<0.41		<1		<0.2		<0.24		2.4		<0.41	
		7/31/2013	<0.4		**2.3**		0.27		0.66		0.49	/ J	<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
		10/15/2013	<0.37		**6.5**		0.38	/ J	1.1	/ J	0.85	/ J	<0.37		<0.37		0.1	F / J	<0.37		<0.94		<0.19		<0.22		4.2	/ J	<0.37	
		10/15/2013 (DUP)	<0.37		**7.5**		**0.67**		1.5		1.2		<0.37		<0.37		<0.37		<0.37		<0.93		<0.19		<0.22		<0.93		0.15	F /
		10/21/2014	<0.39		**5.7**	/ J	0.42	/ J	1.1	/ J	0.93	/ J	<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24	U / UJ	<0.98		<0.39	
		10/21/2014 (DUP)	<0.4		**5.6**	/ J	**0.43**	/ J	1.1	/ J	0.83	/ J	<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		11/19/2014	<0.38		**7**	/ J	**0.52**	/ J	1.3	/ J	0.9	/ J	<0.38		<0.38		0.084	F / J	<0.38		<0.95		<0.19		<0.23		<0.95		<0.38	
		11/19/2014 (DUP)	<0.4		**7.3**	/ J	**0.56**	/ J	1.4	/ J	1	/ J	<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24		<0.99		<0.4	
		12/16/2014	<0.39		**7.4**	/ J	**0.6**	/ J	1.4	/ J	1.2	/ J	<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
		12/16/2014 (DUP)	<0.4		**7.1**	/ J	**0.54**	/ J	1.3	/ J	1	/ J	<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24	U / UJ	<0.99		<0.4	

TABLE B1

Summary of Analytical Results - Explosives
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Will County, Illinois

		Compound	**1,3-DNB**		**2,4-DNT**		**2,6-DNT**		**2-A-4,6-DNT**		**4-A-2,6-DNT**		**HMX**		**NB**		**2-NT**		**3-NT**		**4-NT**		**RDX**		**Tetryl**		**1,3,5-TNB**		**2,4,6-TNT**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13	***Downgradient***																													
	MW808	5/15/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		8/19/2008	<0.44		<0.44		<0.87		<0.87		<0.87		<0.87		<0.44		<0.87		<0.87		<0.87		<0.44		<0.87		<0.44		<0.44	
		10/21/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/21/2008 (DUP)	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		2/4/2009	<0.21		<0.40		<0.40		<0.40		<0.40		<0.40		<0.21		<0.40		<0.40		<0.40		<0.21		<0.51		<0.21		<0.21	
		2/4/2009 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		5/4/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		5/4/2009 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/29/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/29/2009	<0.18		<0.35		<0.35		<0.35		<0.35		<0.35		<0.18		<0.35		<0.35		<0.35		<0.18		<0.44		<0.18		<0.18	
		1/15/2010	<0.20		<0.39		<0.39		<0.39		<0.39		<0.39		<0.20		<0.39		<0.39		<0.39		<0.20		<0.49		<0.20		<0.20	
		4/13/2010	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/20/2010	<0.28		<0.54		<0.54		<0.54		<0.54		<0.54		<0.28		<0.54		<0.54		<0.54		<0.28		<0.68		<0.28		<0.28	
		7/20/2010 (DUP)	<0.19		<0.38		<0.38		<0.38		<0.38		<0.38		<0.19		<0.38		<0.38		<0.38		<0.19		<0.47		<0.19		<0.19	
		10/29/2010	<0.40		<0.78		<0.78		<0.78		<0.78		<0.78		<0.40		<0.78		<0.78		<0.78		<0.40		<0.98		<0.40		<0.40	
		1/27/2011	<0.24		<0.46		<0.46		<0.46		<0.46		<0.46		<0.24		<0.46		<0.46		<0.46		<0.24		<0.58		<0.24		<0.24	
		1/27/2011 (DUP)	<0.30		<0.58		<0.58		<0.58		<0.58		<0.58		<0.30		<0.58		<0.58		<0.58		<0.30		<0.73		<0.30		<0.30	
		4/18/2011	<0.20		<0.38		<0.38		<0.38		<0.38		<0.38		<0.20		<0.38		<0.38		<0.38		<0.20		<0.48		<0.20		<0.20	
		4/18/2011 (DUP)	<0.22		<0.43		<0.43		<0.43		<0.43		<0.43		<0.22		<0.43		<0.43		<0.43		<0.22		<0.54		<0.22		<0.22	
		7/28/2011	<0.25		<0.25		<0.25		<0.48		<0.48		<0.48		<0.25		<0.48		<0.48		<0.48		<0.25		<0.60		<0.25		<0.25	
		7/28/2011 (DUP)	<0.24		<0.24		<0.24		<0.46		<0.46		<0.46		<0.24		<0.46		<0.46		<0.46		<0.24		<0.58		<0.24		<0.24	
		10/12/2011	<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.19		<0.38		<0.38		<0.38		<0.19		<0.47		<0.19		<0.19	
		2/29/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/18/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/18/2012 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/25/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		1/30/2013	<0.41		<0.41		<0.2		<0.2		<0.2		<0.41		<0.41		<0.41		<0.41		<1		<0.2		<0.24		<1		<0.41	
		4/9/2013	<0.41	U / UJ	<0.41	U / UJ	<0.2	U / UJ	<0.2	U / UJ	<0.2	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<0.41	U / UJ	<1	U / UJ	<0.2	U / UJ	<0.24	U / UJ	<1	U / UJ	<0.41	U / UJ
		7/31/2013	<0.4		<0.3		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24		<1		<0.4	
		10/15/2013	<0.37		<0.27		<0.18		<0.18		<0.18		<0.37		<0.37		<0.37		<0.37		<0.91		<0.18		<0.22		<0.91		<0.37	
		10/20/2014	<0.41		<0.41		<0.2		<0.2	U / UJ	<0.2		<0.41		<0.41		<0.41		<0.41		<1		<0.2		<0.24	U / UJ	<1		<0.41	
		11/18/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23		<0.94		<0.38	
		12/15/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit(1)	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M13	*Downgradient*																													
	MW809	5/15/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		8/19/2008	<0.4		<0.4		<0.81		<0.81		<0.81		<0.81		<0.4		<0.81		<0.81		<0.81		<0.4		<0.81		<0.4		<0.4	
		10/21/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		2/5/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		5/5/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/29/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/29/2009	<0.25		<0.49		<0.49		<0.49		<0.49		<0.49		<0.25		<0.49		<0.49		<0.49		<0.25		<0.62		<0.25		<0.25	
		10/29/2009 (DUP)	<0.22		<0.42		<0.42		<0.42		<0.42		<0.42		<0.22		<0.42		<0.42		<0.42		<0.22		<0.53		<0.22		<0.22	
		1/15/2010	<0.22		<0.43		<0.43		<0.43		<0.43		<0.43		<0.22		<0.43		<0.43		<0.43		<0.22		<0.54		<0.22		<0.22	
		4/13/2010	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/20/2010	<0.21		<0.41		<0.41		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.51		<0.21		<0.21	
		10/29/2010	<0.24		<0.46		<0.46		<0.46		<0.46		<0.46		<0.24		<0.46		<0.46		<0.46		<0.24		<0.58		<0.24		<0.24	
		10/29/2010 (DUP)	<0.24		<0.47		<0.47		<0.47		<0.47		<0.47		<0.24		<0.47		<0.47		<0.47		<0.24		<0.59		<0.24		<0.24	
		1/27/2011	<0.21		<0.41		<0.41		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.52		<0.21		<0.21	
		4/19/2011	<0.24		<0.47		<0.47		<0.47		<0.47		<0.47		<0.24		<0.47		<0.47		<0.47		<0.24		<0.59		<0.24		<0.24	
		7/28/2011	<0.23		<0.23		<0.23		<0.44		<0.44		<0.44		<0.23		<0.44		<0.44		<0.44		<0.23		<0.55		<0.23		<0.23	
		10/12/2011	<0.26		<0.26		<0.26		<0.51		<0.51		<0.51		<0.26		<0.51		<0.51		<0.51		<0.26		<0.64		<0.26		<0.26	
		10/12/2011 (DUP)	<0.24		<0.24		<0.24		<0.46		<0.46		<0.46		<0.24		<0.46		<0.46		<0.46		<0.24		<0.58		<0.24		<0.24	
		2/29/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		2/29/2012 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		7/18/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/25/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/25/2012 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		1/30/2013	<0.41		0.1	F /	<0.2		<0.2		<0.2		<0.41		<0.41		<0.41		<0.41		<1		<0.2		<0.24		<1		<0.41	
		4/9/2013	<0.43		<0.43		<0.21		<0.21		<0.21		<0.43		<0.43		<0.43		<0.43		<1.1		<0.21		<0.26		<1.1		<0.43	
		7/31/2013	<0.39		<0.29		<0.2		<0.2		<0.2		<0.39		<0.39		<0.39		<0.39		<0.98		<0.2		<0.24		<0.98		<0.39	
		7/31/2013 (DUP)	<0.4		<0.3		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<0.99		<0.2		<0.24		<0.99		<0.4	
		10/15/2013	<0.36		<0.27		<0.18		<0.18		<0.18		<0.36		<0.36		<0.36		<0.36		<0.9		<0.18		<0.22		<0.9		<0.36	
		10/20/2014	<0.4		<0.4		<0.2		<0.2	U / UJ	<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		11/18/2014	<0.37		<0.37		<0.19		<0.19	U / UJ	<0.19		<0.37		<0.37		<0.37		<0.37		<0.93		<0.19		<0.22	U / UJ	<0.93		<0.37	
		12/15/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	

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		Compound	1,3-DNB		2,4-DNT		2,6-DNT		2-A-4,6-DNT		4-A-2,6-DNT		HMX		NB		2-NT		3-NT		4-NT		RDX		Tetryl		1,3,5-TNB		2,4,6-TNT	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[1]	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M13	*Downgradient*																													
	MW811	10/29/2014	<0.4		<0.4		<0.2		<0.2		<0.2		<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
		11/19/2014	<0.38		<0.38		<0.19		<0.19	U / UJ	<0.19		<0.38		<0.38		<0.38		<0.38		<0.96		<0.19		<0.23		<0.96		<0.38	
		12/16/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
M11	*Upgradient*																													
	MW802	5/15/2008	<0.7		<0.7		<1.4		<1.4		3		<1.4		<0.7		<1.4		<1.4		<1.4		<0.7		<1.4		<0.7		<0.7	
		10/7/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/7/2008 (DUP)	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/4/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/27/2009	<0.24		<0.47		<0.47		<0.47		<0.47		<0.47		<0.24		<0.47		<0.47		<0.47		<0.24		<0.59		<0.24		<0.24	
		4/13/2010	<0.17		<0.33		<0.33		<0.33		<0.33		<0.33		<0.17		<0.33		<0.33		<0.33		<0.17		<0.42		<0.17		<0.17	
		10/28/2010	<0.34		<0.65		<0.65		<0.65		<0.65		<0.65		<0.34		<0.65		<0.65		<0.65		<0.34		<0.82		<0.34		<0.34	
		4/15/2011	<0.37		<0.72		<0.72		<0.72		<0.72		<0.72		<0.37		<0.72		<0.72		<0.72		<0.37		<0.91		<0.37		<0.37	
		10/11/2011	<0.17		<0.17		<0.17		<0.34		<0.34		<0.34		<0.17		<0.34		<0.34		<0.34		<0.17		<0.42		<0.17		<0.17	
		4/16/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	U / UJ
		10/24/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/16/2013	<0.39		<0.29		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23		<0.97		<0.39	
		12/11/2014	<0.37		<0.37		<0.19		<0.19		<0.19		<0.37		<0.37		<0.37		<0.37		<0.93		<0.19		<0.22	U / UJ	<0.93		<0.37	
	MW803	10/7/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/4/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/27/2009	<0.20		<0.39		<0.39		<0.39		<0.39		<0.39		<0.20		<0.39		<0.39		<0.39		<0.20		<0.49		<0.20		<0.20	
		4/13/2010	<0.17		<0.32		<0.32		<0.32		<0.32		<0.32		<0.17		<0.32		<0.32		<0.32		<0.17		<0.40		<0.17		<0.17	
		10/28/2010	<0.33		<0.63		<0.63		<0.63		<0.63		<0.63		<0.33		<0.63		<0.63		<0.63		<0.33		<0.79		<0.33		<0.33	
		4/15/2011	<0.31		<0.59		<0.59		<0.59		<0.59		<0.59		<0.31		<0.59		<0.59		<0.59		<0.31		<0.75		<0.31		<0.31	
		10/11/2011	<0.18		<0.18		<0.18		<0.35		<0.35		<0.35		<0.18		<0.35		<0.35		<0.35		<0.18		<0.44		<0.18		<0.18	
		10/24/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/16/2013	<0.38		<0.28		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23		<0.94		<0.38	
		12/15/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
	Downgradient																													
	MW333	5/12/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/6/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/5/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/28/2009	<0.21		<0.41		<0.41		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.52		<0.21		<0.21	
		4/13/2010	<0.17		<0.34		<0.34		<0.34		<0.34		<0.34		<0.17		<0.34		<0.34		<0.34		<0.17		<0.42		<0.17		<0.17	
		10/28/2010	<0.30		<0.58		<0.58		<0.58		<0.58		<0.58		<0.30		<0.58		<0.58		<0.58		<0.30		<0.73		<0.30		<0.30	
		4/18/2011	<0.18		<0.36		<0.36		<0.36		<0.36		<0.36	U / UJ	<0.18		<0.36		<0.36		<0.36		<0.18		<0.45		<0.18		<0.18	
		10/11/2011	<0.17		<0.17		<0.17		<0.34		<0.34		<0.34		<0.17		<0.34		<0.34		<0.34		<0.17		<0.42		<0.17		<0.17	
		10/24/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/16/2013	<0.37		<0.27		<0.18		<0.18		<0.18		<0.37		<0.37		<0.37		<0.37		<0.91		<0.18		<0.22		<0.91		<0.37	
		12/15/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	
	MW334	5/12/2008	<0.46		<0.46		<0.92		<0.92		<0.92		<0.92		<0.46		<0.92		<0.92		<0.92		<0.46		<0.92		<0.46		<0.46	
		10/6/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/5/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/28/2009	<0.20		<0.39		<0.39		<0.39		<0.39		<0.39		<0.20		<0.39		<0.39		<0.39		<0.20		<0.49		<0.20		<0.20	
		4/13/2010	<0.18		<0.34		<0.34		<0.34		<0.34		<0.34		<0.18		<0.34		<0.34		<0.34		<0.18		<0.43		<0.18		<0.18	
		10/28/2010	<0.32		<0.63		<0.63		<0.63		<0.63		<0.63		<0.32		<0.63		<0.63		<0.63		<0.32		<0.79		<0.32		<0.32	
		4/18/2011	<0.19		<0.37		<0.37		<0.37		<0.37		<0.37	U / UJ	<0.19		<0.37		<0.37		<0.37		<0.19		<0.47		<0.19		<0.19	
		10/11/2011	<0.18		<0.18		<0.18		<0.36		<0.36		<0.36		<0.18		<0.36		<0.36		<0.36		0.15	F / NJ	<0.45		<0.18		<0.18	
		10/11/2011 (DUP)	<0.26		<0.26		<0.26		<0.51		<0.51		<0.51		<0.26		<0.51		<0.51		<0.51		0.21	F / NJ	<0.64		<0.26		<0.26	
		10/24/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/16/2013	<0.37		<0.28		<0.19		<0.19		<0.19		<0.37		<0.37		<0.37		<0.37		<0.93		<0.19		<0.22		<0.93		<0.37	
		12/15/2014	<0.39		<0.39		<0.19		<0.19		<0.19		<0.39		<0.39		<0.39		<0.39		<0.97		<0.19		<0.23	U / UJ	<0.97		<0.39	
	MW335	5/13/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/7/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/7/2008 (DUP)	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/4/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/28/2009	<0.29		<0.56		<0.56		<0.56		<0.56		<0.56		<0.29		<0.56		<0.56		<0.56		<0.29		<0.71		<0.29		<0.29	
		4/13/2010	<0.25		<0.49		<0.49		<0.49		<0.49		<0.49		<0.25		<0.49		<0.49		<0.49		<0.25		<0.62		<0.25		<0.25	
		4/13/2010 (DUP)	<0.18		<0.36		<0.36		<0.36		<0.36		<0.36		<0.18		<0.36		<0.36		<0.36		<0.18		<0.45		<0.18		<0.18	
		10/28/2010	<0.24		<0.46		<0.46		<0.46		<0.46		<0.46		<0.24		<0.46		<0.46		<0.46		<0.24		<0.58		<0.24		<0.24	
		4/15/2011	<0.19		<0.38		<0.38		<0.38		<0.38		<0.38		<0.19		<0.38		<0.38		<0.38		<0.19		<0.47		<0.19		<0.19	
		10/12/2011	<0.24		<0.24		<0.24		<0.47		<0.47		<0.47		<0.24		<0.47		<0.47		<0.47		<0.24		<0.59		<0.24		<0.24	U / UJ
		4/16/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	U / UJ
		10/24/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/16/2013	<0.38		<0.28		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23		<0.94		<0.38	
		10/16/2013 (DUP)	<0.37		<0.28		<0.19		<0.19		<0.19		<0.37		<0.37		<0.37		<0.37		<0.93		<0.19		<0.22		<0.93		<0.37	
		12/11/2014	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.95		<0.19		<0.23	U / UJ	<0.95		<0.38	
		12/11/2014 (DUP)	<0.38		<0.38		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23	U / UJ	<0.94		<0.38	

TABLE B1

Summary of Analytical Results - Explosives
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**1,3-DNB**		**2,4-DNT**		**2,6-DNT**		**2-A-4,6-DNT**		**4-A-2,6-DNT**		**HMX**		**NB**		**2-NT**		**3-NT**		**4-NT**		**RDX**		**Tetryl**		**1,3,5-TNB**		**2,4,6-TNT**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit(1)	10		0.42		0.42		NS		NS		5100		51		5100		NS		NS		2.6		200		5.1		9.5	
		Surface Water RG	4		330		150		NS		NS		260		8000		62		NS		NS		500		700		15		75	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M11	***Downgradient***																													
	MW336	5/13/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		10/7/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/5/2009	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		5/5/2009 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/27/2009	<0.21		<0.40		<0.40		<0.40		<0.40		<0.40		<0.21		<0.40		<0.40		<0.40		<0.21		<0.51		<0.21		<0.21	
		10/27/2009 (DUP)	<0.21		<0.41		<0.41		<0.41		<0.41		<0.41		<0.21		<0.41		<0.41		<0.41		<0.21		<0.51		<0.21		<0.21	
		4/13/2010	<0.24		<0.46		<0.46		<0.46		<0.46		<0.46		<0.24		<0.46		<0.46		<0.46		<0.24		<0.58		<0.24		<0.24	
		10/28/2010	<0.30		<0.59		<0.59		<0.59		<0.59		<0.59		<0.30		<0.59		<0.59		<0.59		<0.30		<0.74		<0.30		<0.30	
		4/18/2011	<0.19		<0.37		<0.37		<0.37		<0.37		<0.37	U / UJ	<0.19		<0.37		<0.37		<0.37		<0.19		<0.47		<0.19		<0.19	
		10/12/2011	<0.18		<0.18		<0.18		<0.36		<0.36		<0.36		<0.18		<0.36		<0.36		<0.36		<0.18		<0.45		<0.18		<0.18	U / UJ
		4/16/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	U / UJ
		10/24/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31	U / J	<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/24/2012 (DUP)	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/16/2013	<0.38		<0.28		<0.19		<0.19		<0.19		<0.38		<0.38		<0.38		<0.38		<0.94		<0.19		<0.23		<0.94		<0.38	
		12/11/2014	<0.42		<0.42		<0.21		<0.21		<0.21		<0.42		<0.42		<0.42		<0.42		<1.1		<0.21		<0.25	U / UJ	<1.1		<0.42	
	MW804	5/15/2008	<0.42		<0.42		<0.83		<0.83		<0.83		<0.83		<0.42		<0.83		<0.83		<0.83		<0.42		<0.83		<0.42		<0.42	
		10/6/2008	<0.46		<0.46		<0.92		1.6		4.7		<0.92		<0.46		<0.92		<0.92		<0.92		<0.46		<0.92		<0.46		0.52	
		5/5/2009	<0.16		<0.31		<0.31		0.81		2.6		0.8		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		0.57	
		10/27/2009	<0.24		<0.47		<0.47		0.73		2.3		0.79		<0.24		<0.47		<0.47		<0.47		0.22	F /	<0.59		<0.24		1.4	
		4/13/2010	<0.17		<0.33		<0.33		<0.33		0.88		<0.33		<0.17		<0.33		<0.33		<0.33		<0.17		<0.41		<0.17		<0.17	
		10/28/2010	<0.38		<0.74		<0.74		<0.74		<0.74		<0.74		<0.38		<0.74		<0.74		<0.74		<0.38		<0.93		<0.38		<0.38	
		4/15/2011	<0.45		<0.88		<0.88		0.52	F /	1.4		0.37	F /	<0.45		<0.88		<0.88		<0.88		0.26	F /	<1.1		<0.45		<0.45	
		4/15/2011 (DUP)	<0.32		<0.61		<0.61		0.51	F /	1.4		0.39	F /	<0.32		<0.61		<0.61		<0.61		<0.32		<0.77		<0.32		<0.32	
		10/11/2011	<0.16		<0.16		<0.16		0.37		1	/ J	0.68		<0.16		<0.31		<0.31		<0.31		0.22		<0.39		<0.16		<0.16	
		10/24/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/16/2013	<0.37		<0.27		<0.18		<0.18		<0.18		<0.37		<0.37		<0.37		<0.37		<0.92		<0.18		<0.22		<0.92		<0.37	
		12/11/2014	<0.4		<0.4		<0.2		0.066	F / J	0.16	F / J	<0.4		<0.4		<0.4		<0.4		<1		<0.2		<0.24	U / UJ	<1		<0.4	
	MW805	10/6/2008	<0.39		<0.39		<0.78		<0.78		<0.78		<0.78		<0.39		<0.78		<0.78		<0.78		<0.39		<0.78		<0.39		<0.39	
		5/5/2009	<0.17		<0.32		<0.32		<0.32		<0.32		<0.32		<0.17		<0.32		<0.32		<0.32		<0.17		<0.40		<0.17		<0.17	
		10/27/2009	<0.16		<0.32		<0.32		<0.32		0.26	F /	<0.32		<0.16		<0.32		<0.32		<0.32		<0.16		<0.40		<0.16		<0.16	
		4/13/2010	<0.41		<0.79		<0.79		<0.79		<0.79		<0.79		<0.41		<0.79		<0.79		<0.79		<0.41		<0.99		<0.41		<0.41	
		11/2/2010	<0.27		<0.52		<0.52		<0.52		<0.52		<0.52		<0.27		<0.52		<0.52		<0.52		<0.27		<0.66		<0.27		<0.27	
		4/15/2011	<0.31		<0.59		<0.59		<0.59		<0.59		<0.59		<0.31		<0.59		<0.59		<0.59		<0.31		<0.75		<0.31		<0.31	
		10/11/2011	<0.16		<0.16		<0.16		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		4/16/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	U / UJ
		10/24/2012	<0.16		<0.31		<0.31		<0.31		<0.31		<0.31		<0.16		<0.31		<0.31		<0.31		<0.16		<0.39		<0.16		<0.16	
		10/16/2013	<0.37	U / UJ	<0.28	U / UJ	<0.18		<0.18	U / UJ	<0.18	U / UJ	<0.37	U / UJ	<0.37		<0.37	U / UJ	<0.37		<0.92	U / UJ	<0.18	U / UJ	<0.22	U / UJ	<0.92	U / UJ	<0.37	U / UJ
		12/11/2014	<0.37		<0.37		<0.19		<0.19		<0.19		<0.37		<0.37		<0.37		<0.37		<0.93		<0.19		<0.22	U / UJ	<0.93		<0.37	

Footnotes:

(1) Project Action Limits (Remedial Goal, {RG}) obtained from Worksheet #15 of Appendix B (QAPP) of the *Long Term Monitoring Plan* (Toltest, 2010). IEPA Class II groundwater standards for industrial uses are presented where Class I and Class II standards (potable and industrial uses, respectively) were both available.

General Notes:

Sites L2, L14, and M11 are not sampled during Second Quarter.
Data since the sampling round conducted immediately prior to the completion of each individual site RA are shown.

µg/L = microgram per liter
Bolded result indicates Preventive Action Limit (Remedial Goal {RG}) exceedance
NS = No standard
< = Result shows laboratory Method Reporting Limit for non-detected results
LF/VF = Lab Flag/Validation Flag
B = Blank contamination
F = Concentration below the reported detection limit
J = Estimated concentration
JJ = data is estmated due to more then one criteria
U = Not detected
UJ = Estimated detection limit
Q = Laboratory Control Sample recovery lower than quality control limits
DUP = duplicate

1,3-DNB = 1,3-Dinitrobenzene
2,4-DNT = 2,4-Dinitrotoluene
2,6-DNT = 2,6-Dinitrotoluene
2-A-4,6-DNT = 2-amino-4,6-Dinitrotoluene
4-A-2,6-DNT = 4-amino-2,6-Dinitrotoluene
HMX = high melting explosive
NB = Nitrobenzene
2-NT = 2-Nitrotoluene
3-NT = 3 Nitrotoluene
4-NT = 4-Nitrotoluene
RDX = Research Department Explosive
1,3,5-TNB = 1,3,5-Trinitrobenzene
2,4,6-TNT = 2,4,6-Trinitrotoluene

B2 - SUMMARY OF HISTORICAL GROUNDWATER RESULTS – METALS

TABLE B2

Summary of Analytical Results - Metals
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Analyte	Aluminum		Antimony		Arsenic		Barium		Cadmium		Calcium		Chromium		Cobalt		Copper		Iron		Lead		Magnesium		Manganese		Mercury		Nickel		Potassium		Silver		Sodium		Vanadium		Zinc	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit(1)	100		0.024		0.2		NS		0.05		NS		1.0		NS		NS		5.0		0.1		NS		10		NS		NS		NS		0.511		NS		NS		10	
		Surface Water RG	NS		0.61		0.16		5		0.0023		NS		0.44		NS		0.026		1.0		0.064		NS		1.0		0.103		1.0		NS		0.005		NS		NS		1.0	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
L3	*Upgradient*																																									
		5/6/2009	<0.20		<0.020		<0.010		0.037		<0.0020		68		<0.010		0.004	F /	<0.010		<0.10		<0.0050		28		0.036		<0.0002		<0.010		1.5		<0.0050		11		<0.0050		<0.020	
		10/23/2009	2.7		<0.02		<0.01		0.047		<0.002		34		0.0041	F /	0.0019	F /	0.0079	F /	3.9		0.0058		15		0.15		<0.0002		0.007	F /	5.8		<0.005		5.6		0.0079		0.019	F / U
		4/8/2010	0.08	F / U	<0.020		<0.010		0.029		<0.0020		47		<0.010		0.0053		0.0019	F /	0.09	F / U	<0.0050		20		0.023		<0.0002		0.002	F /	2.7		<0.0050		12		0.0021	F /	0.005	F /
		10/26/2010	<0.20		<0.020		<0.010		0.042		0.0006	F / U	75		<0.010		<0.0050		0.0018	F /	0.045	F /	<0.0050		38		0.023		<0.0002		<0.010		2.7		<0.0050		14		<0.0050		<0.020	
		10/26/2010 (DUP)	<0.20		<0.020		<0.010		0.042		0.00076	F / U	75		<0.010		<0.0050		0.002	F /	0.055	F /	<0.0050		38		0.023		0.000066	F / J	<0.010		2.7		<0.0050		14		<0.0050		<0.020	
	SW004	4/14/2011	0.052	F /	<0.02		<0.01		0.04		<0.002		77		<0.01		<0.005		<0.01		<0.2		<0.005		35		0.056		<0.0002		<0.01		1.5		<0.005		16		0.0024	F /	<0.02	
		4/14/2011 (DUP)	<0.2		<0.02		<0.01		0.04		<0.002		77		<0.01		<0.005		<0.01		<0.2		0.0021	F /	35		0.055		<0.0002		<0.01		1.5		<0.005		16		0.0029	F /	<0.02	
		10/14/2011	<0.20		<0.020		<0.010		0.026		0.00072	F /	63		<0.010		<0.0050		0.0014	F /	<0.20		<0.0050		35		0.018		<0.0002	U / UJ	<0.010		1.8		<0.0050		20		<0.0050		<0.020	
		4/10/2012	<0.20		<0.020		<0.010		0.039		0.0009	F /	73		<0.010		<0.0050		0.018	/ U	<0.20		<0.0050		38		0.09		<0.20		<0.010		1.4		<0.0050		15		<0.0050		<0.020	
		4/16/2013	0.1	F /	<0.02		<0.025		0.036		<0.005		60		<0.015		<0.015		0.0025	F /	0.13		<0.015		25		0.014		<0.0002		0.0014	F /	2.2	F /	<0.015		15		<0.015		<0.15	
		10/23/2014	<0.3		<0.02		<0.025		0.044		0.00058	F /	90		<0.015		<0.015		<0.015		0.036	F /	<0.015		39		0.035		<0.0002		<0.04		1.5	F /	<0.015		16		<0.015		<0.15	
	In-Plume/Downgradient																																									
		5/21/2008	<0.2		<0.02		<0.01		0.043		<0.002		94		<0.01		<0.005		0.0027	F /	<0.15		0.0029	F /	49		<0.01		<0.0002		<0.01		0.95		<0.005		11		<0.005		0.0069	F /
		10/29/2008	0.016	F /	<0.02		<0.01		0.05		<0.002		95		<0.01		<0.005		<0.01		<0.15		<0.005		49		0.036		<0.0002		<0.01		1.3		<0.005		10		0.0037	F /	0.02	F /
		10/29/2008 (DUP)	0.032	F /	<0.02		<0.01		0.052		<0.002		99		<0.01		<0.005		0.001	F /	<0.15		<0.005		51		0.051		<0.0002		<0.01		1.4		<0.005		11		0.0044	F /	0.018	F /
		5/6/2009	<0.2	U / UJ	<0.02	U / UJ	<0.01	U / UJ	0.042	/ J	<0.002	U / UJ	87	/ J	<0.01	U / UJ	0.0018	F / J	<0.01	U / UJ	<0.1	U / UJ	<0.005	U / UJ	47	/ J	0.0025	F / J	<0.0002		<0.01	U / UJ	1.2	/ J	<0.005	U / UJ	9.9	/ J	<0.005	U / UJ	<0.02	U / UJ
		10/27/2009	<0.2		<0.02		<0.01		0.049		<0.002		92		<0.01		0.0018	F /	<0.01		<0.1		<0.005		49		0.003	F /	<0.0002		<0.01		1.2		<0.005		8.1		0.0031	F /	<0.02	
		4/12/2010	<0.20		<0.020		<0.010		0.043		<0.0020		96		<0.010		<0.0050		<0.010		<0.20		<0.0050		52		<0.010		<0.0002		<0.010		0.95		<0.0050		8.7		0.0026	F /	<0.020	
		10/26/2010	<0.20		<0.020		<0.010		0.07		0.00079	F / U	100		<0.010		<0.0050		0.002	F /	<0.20		0.0023	F /	52		0.0033	F /	<0.0002		<0.010		1.6		<0.0050		10		<0.0050		0.0053	F /
	MW412	4/14/2011	<0.2		<0.02		<0.01		0.04		<0.002		91		<0.01		<0.005		<0.01		<0.2		<0.005		48		<0.01		<0.0002		<0.01		1		<0.005		8.1		0.0025	F /	0.0044	F /
		10/17/2011	<0.20		<0.020		<0.010		0.048		0.00086	F / U	92		<0.010		<0.0050		<0.010		<0.20		<0.0050		45		<0.010		<0.0002		<0.010		1.3		<0.0050		6.9		<0.0050		<0.020	
		4/11/2012	<0.20		<0.020		<0.010		0.042		0.0011	F /	96		<0.010		<0.0050		0.026	/ U	<0.20		<0.0050		51		<0.010		<0.20		<0.010		1		<0.0050		7.7		<0.0050		<0.020	
		10/30/2012	<0.2		<0.02		<0.01		0.053		0.00093	F /	100		<0.01		<0.005		0.0018	F /	<0.2		0.0017	F /	52		<0.01		<0.2		<0.01		1.4		<0.005		11		<0.005		<0.02	
		4/15/2013	<0.3		<0.02		<0.025		0.036		<0.005		79		<0.015		<0.015		<0.015		<0.1		<0.015		40		<0.01		<0.0002		<0.04		1.1	F /	<0.015		6.8		<0.015		<0.15	
		10/21/2013	<0.3		<0.02		0.0045	F /	0.052		<0.002		95		<0.015		<0.015		<0.015		<0.1		<0.015		50		<0.01		<0.2		<0.04		1.4	F /	<0.005		11		<0.015		<0.15	
		10/23/2014	<0.3		<0.02		<0.025		0.046		0.00062	F /	89		<0.015		<0.015		<0.015		<0.1		<0.015		46		<0.01		<0.0002		<0.04		1.2	F /	<0.015		6.7		<0.015		<0.15	
		12/10/2014	<0.3		<0.02		<0.025		0.044		<0.005		93		<0.015		<0.015		<0.015		<0.1		<0.015		50		<0.01		<0.0002		<0.04		1.3	F /	0.0011	F / B	6.7		<0.015		<0.15	
	Early Warning/Downgradient																																									
		5/20/2008	<0.2		<0.02		<0.01		0.011		<0.002		72		<0.01		<0.005		0.0019	F /	<0.15		0.0021	F /	38		0.023		<0.0002		0.0066	F /	5.5		<0.005		25		<0.005		0.023	
		10/28/2008	0.026	F /	<0.02		<0.01		0.012		<0.002		75		<0.01		<0.005		<0.01		0.047	F /	0.0026	F /	40		0.018		<0.0002		<0.01		5.1		<0.005		26		0.0036	F /	0.021	
		10/26/2009	<0.2		<0.02		<0.01		0.013		<0.002		90		<0.01		0.00094	F /	<0.01		0.36		<0.005		48		0.015		<0.0002		<0.01		5.7		<0.005		25		0.0038	F /	<0.02	
		4/9/2010	0.021	F / U	<0.020		<0.010		0.011		<0.0020		81		<0.010		<0.0050		<0.010		<0.20		<0.0050		43		0.021		<0.0002		<0.010		4.3		<0.0050		22		0.0024	F /	<0.020	
		4/9/2010 (DUP)	<0.20		<0.020		<0.010		0.011		<0.0020		81		<0.010		<0.0050		0.0028	F /	<0.20		<0.0050		43		0.021		<0.0002		<0.010		4.3		<0.0050		22		0.0026	F /	0.0036	F /
		10/26/2010	<0.20		<0.020		<0.010		0.012	/ U	0.00076	F / U	78		<0.010		<0.0050		<0.010		0.067	F /	<0.0050		40		0.015		0.000077	F / J	<0.010		5.6		<0.0050		28		<0.0050		<0.020	
		4/14/2011	<0.2		0.0036	F /	<0.01		0.011		<0.002		82		<0.01		<0.005		<0.01		<0.2		<0.005		42		0.016		<0.0002		<0.01		4.7		<0.005		21		0.003	F /	<0.02	
		10/14/2011	<0.20		<0.020		<0.010		0.012		0.00091	F /	84		<0.010		<0.0050		<0.010		<0.20		<0.0050		43		0.026		<0.0002	U / UJ	<0.010		5		<0.0050		24		<0.0050		<0.020	
		10/14/2011 (DUP)	<0.20		<0.020		<0.010		0.012		0.00092	F /	82		<0.010		<0.0050		<0.010		0.07	F /	<0.0050		42		0.025		<0.0002	U / UJ	<0.010		4.9		<0.0050		23		<0.0050		<0.020	
		4/11/2012	<0.20		<0.020		<0.010		0.011		0.00078	F /	83		<0.010		<0.0050		0.027	/ U	<0.20		<0.0050		43		0.033		<0.20		<0.010		4.4		<0.0050		22		<0.0050		0.0087	F /
	MW630	4/11/2012 (DUP)	<0.20		<0.020		<0.010		0.011		0.00087	F /	84		<0.010		<0.0050		0.02	/ U	<0.20		<0.0050		44		0.032		<0.20		<0.010		4.4		<0.0050		22		<0.0050		<0.020	
		10/30/2012	<0.2		0.0026	F /	<0.01		0.012	/ F	0.00081	F /	78		<0.01		<0.005		0.0019	F /	<0.2		<0.005		40		0.019		<0.2		<0.01		5.5		<0.005		27		<0.005		<0.02	
		4/16/2013	<0.3		<0.02		<0.025		0.012		<0.005		84		<0.015		<0.015		<0.015		<0.1		<0.015		42		0.0043	F /	<0.0002		<0.04		4.3		<0.015		22		<0.015		<0.15	
		4/16/2013 (DUP)	<0.3		<0.02		<0.025		0.014		<0.005		68		<0.015		<0.015		<0.015		0.028	F /	<0.015		35		0.023		<0.0002		<0.04		5.2		<0.015		28		<0.015		<0.15	
		10/21/2013	<0.3		<0.02		<0.025		0.011		<0.002		68	/ J	<0.015		<0.015		<0.015		0.073	F /	<0.015		35	/ J	0.024		<0.2		<0.04		4.4		0.0013	F / B	21	/ J	<0.015		<0.15	
		10/21/2013 (DUP)	<0.3		<0.02		0.0052	F /	0.013		<0.002		80		<0.015		<0.015		<0.015		0.078	F /	<0.015		41		0.029		<0.2		<0.04		5.1		<0.005		25		<0.015		<0.15	
		10/23/2014	<0.3		<0.02		<0.025		0.013		0.00047	F /	78		<0.015		<0.015		<0.015		0.17	/ J	<0.015	U / UJ	40		0.067		<0.0002		<0.04		5.1	/ J	<0.015	U / UJ	25	/ J	<0.015		<0.15	
		10/23/2014 (DUP)	<0.3		<0.02		<0.025		0.013		<0.005		77		<0.015		<0.015		<0.015		0.15		<0.015		39		0.066		<0.0002		<0.04		5		<0.015		24		<0.015		<0.15	
		12/10/2014	<0.3		<0.02		<0.025		0.013		<0.005		84		<0.015		<0.015		<0.015		<0.1		<0.015		44		0.011		<0.0002		<0.04		4.8		<0.015		24		0.0013	F /	<0.15	
		12/10/2014 (DUP)	<0.3		<0.02		<0.025		0.013		<0.005		85		<0.015		<0.015		<0.015		<0.1		<0.015		45		0.01		<0.0002		<0.04		4.9		0.0014	F / B	23		0.0012	F /	<0.15	
		5/20/2008	<0.2		0.0067	F /	<0.01		0.011		<0.002		67		<0.01		<0.005		0.0022	F /	0.06	F /	<0.005		36		0.014		<0.0002		<0.01		5.5		<0.005		26		<0.005		0.025	
		10/28/2008	0.018	F /	<0.02		<0.01		0.011		<0.002		71		<0.01		<0.005		<0.01		0.093	F /	<0.005		38		0.0089	F /	<0.0002		<0.01		5		<0.005		26		0.0037	F /	0.0099	F /
		10/26/2009	<0.2		<0.02		<0.01		0.01		<0.002		70		<0.01		0.0032	F /	<0.01		0.049	F / U	<0.005		38		0.013		<0.0002		<0.01		5.1		<0.005		25		0.003	F /	<0.02	
		4/9/2010	0.037	F / U	<0.020		<0.010		0.011		<0.0020		64		0.0019	F /	<0.0050		<0.010		0.33	/ U	0.0019	F / U	34		0.025		<0.0002		<0.010		4.7		0.00088	F /	25		0.0025	F /	0.095	
		10/26/2010	<0.20		0.0035	F /	<0.010		0.01	/ U	0.0006	F / U	66		<0.010		<0.0050		<0.010		0.1	F /	<0.0050		34		0.0086	F /	0.000062	F / J	<0.010		5.1		<0.0050		28		<0.0050		<0.020	
		4/14/2011	<0.2		<0.02		<0.01		0.014		<0.002		68		<0.01		<0.005		<0.01		<0.2		0.0024	F /	36		0.014		<0.0002		<0.01		5.6		<0.005		26		0.002	F /	0.0088	F /
		10/14/2011	<0.20		<0.020		<0.010		0.018		0.00081	F /	67		<0.010		<0.0050		<0.010		0.1	F /	<0.0050		35		0.029		<0.0002	U / UJ	<0.010		5.1		<0.0050		28		<0.0050		<0.020	
		4/11/2012	<0.20		<0.020		<0.010		0.017		0.00082	F /	67		<0.010		<0.0050		0.015	/ U	<0.20		<0.0050		36		0.022		<0.20		<0.010		4.9		<0.0050		28		<0.0050		<0.020	
	MW631	10/30/2012	<0.2		<0.02		<0.01		0.017		0.0007	F /	67		<0.01		<0.005		0.0011	F /	0.17	F /	<0.005		35		0.029		<0.2		<0.01		5.3		<0.005		29		<0.005		<0.02	
		10/30/2012 (DUP)	<0.2		<0.02		<0.01		0.017		0.00071	F /	67		<0.01		<0.005		0.0012	F /	0.14	F /	0.0017	F /	34		0.029		<0.2		<0.01		5.2		<0.005		29		<0.005		<0.02	
		4/16/2013	<0.3		<0.02		<0.025		0.014		<0.005		68		<0.015		<0.015		<0.015		0.028	F /	<0.015		35		0.024		<0.0002		<0.04		5.2		<0.015		28		<0.015		<0.15	
		10/21/2013	<0.3		<0.02		<0.025		0.011		<0.002		60		<0.015		<0.015		<0.015		0.095	F /	<0.015		31		0.012		<0.2		<0.04		4.9		<0.005		29		<0.015		0.0049	F /
		10/23/2014	<0.3		<0.02		0.0045	F /	0.018		<0.005		63		<0.015		<0.015		<0.015		0.13		<0.015		33		0.032		<0.0002		<0.04		5.3		<0.015		28		<0.015		<0.15	
		12/10/2014	<0.3		<0.02		<0.025		0.015		<0.005		69		<0.015		<0.015		<0.015		<0.1		<0.015		37		0.0068	F /	<0.0002		<0.04		5.5		0.0013	F / B	29		<0.015		<0.15	
		12/10/2014 (DUP)	<0.3		<0.02		<0.025		0.015		<0.005		70		<0.015		<0.015		<0.015		0.022	F /	<0.015		38		0.0073	F /	<0.0002		<0.04		5.5		0.0011	F / B	29		0.0016	F /	0.0075	F /
		5/21/2008	<0.2		<0.02		<0.01		0.039		<0.002		85		<0.01		<0.005		0.0034	F /	<0.15		0.0033	F /	44		<0.01		<0.0002		<0.01		0.89		<0.005		11		<0.005		0.021	
		5/21/2008 (DUP)	<0.2		<0.02		<0.01		0.043		<0.002		93		<0.01		<0.005		0.0029	F /	<0.15		0.0022	F /	49		<0.01		<0.0002		<0.01		0.95		<0.005		11		<0.005		0.0067	F /
		10/29/2008	0.026	F /	<0.02		<0.01		0.066		<0.002		80		<0.01		<0.005		0.0012	F /	<0.15		<0.005		35		<0.01		<0.0002		<0.01		1.4		<0.005		23		0.0035	F /	0.025	
		5/6/2009	<0.2	U / UJ	<0.02	U / UJ	<0.01	U / UJ	0.045	/ J	<0.002	U / UJ	72	/ J	<0.01	U / UJ	0.0027	F / J	<0.01	U / UJ	<0.1	U / UJ	<0.005	U / UJ	32	/ J	0.0047	F / J	<0.0002		<0.01	U / UJ	1.3	/ J	<0.005	U / UJ	6	/ J	<0.005	U / UJ	<0.02	U / UJ
		10/27/2009	<0.2		<0.02		<0.01		0.066		<0.002		100		<0.01		0.0032	F /	<0.01		<0.1		<0.005		45		0.0048	F /	<0.0002		0.0013	F /	1.4		<0.005		6.4		0.0033	F /	<0.02	
		4/12/2010	<0.20		<0.020		<0.010		0.045		<0.0020		80		<0.010		<0.0050		<0.010		<0.20		<0.0050		38		<0.010		<0.0002		<0.010		0.93		<0.0050		5.6		0.0017	F /	<0.020	
		10/26/2010	0.038	F /	<0.020		<0.010		0.066		0.00052	F / U	93		<0.010		<0.0050		<0.010		0.089	F /	<0.0050		41		0.0062	F /	<0.0002		<0.010		1.5		<0.0050		6.3		<0.0050		<0.020	
	MW633	4/14/2011	<0.2		<0.02		<0.01		0.04		<0.002		76		<0.01		<0.005		<0.01		<0.2		0.0018	F /	34		<0.01		<0.0002		<0.01		0.93		<0.005		5.2		0.0025	F /	<0.02	
		10/17/2011	0.16	F /	0.0029	F /	<0.010		0.065		0.00086	F / U	98		<0.010		<0.0050		0.0014	F /	0.25		<0.0050		42		0.0048	F /	<0.0002		<0.010		1.1		<0.0050		10		<0.0050		<0.020	
		4/11/2012	<0.20		<0.020		<0.010		0.047		0.00079	F /	83		<0.010		<0.0050		0.023	/ U	<0.20		<0.0050		37		<0.010		<0.20		<0.010		1		<0.0050		5.7		<0.0050		<0.020	
		10/30/2012	0.069	F /	<0.02		<0.01		0.062		0.0007	F /	93		0.0012	F /	<0.005		0.0027	F /	0.16	F /	<0.005		41		0.0016	F /	<0.2		<0.01		1.4		<0.005		7.9		0.00087	F /	<0.02	
		4/15/2013	0.44		<0.02		<0.025		0.039		<0.005		67		<0.015		<0.015		0.0017	F /	0.4		<0.015		30		0.0032	F /	<0.0002		<0.04		1	F /	<0.015		6.9		<0.015		<0.15	
		10/21/2013	<0.3		<0.02		<0.025		0.05		<0.002		74		<0.015		<0.015		<0.015		<0.1		<0.015		32		0.00072	F / B	<0.2		<0.04		1.3	F /	<0.005		5.3		<0.015		<0.15	
		10/23/2014	<0.3		<0.02		<0.025		0.051		<0.005		85		<0.015		<0.015		<0.015		<0.1		<0.015		36		<0.01		<0.0002		<0.04		1.3	F /	<0.015		4.7	F /	<0.015		0.0089	F /
		12/10/2014	0.066	F /	<0.02		<0.025		0.051		<0.005		89		0.0007	F /	<0.015		<0.015		0.23		<0.015		40		0.0036	F /	<0.0002		<0.04		1.1	F /	0.0015	F / B	4.3	F /	<0.015		<0.15	

TABLE B2

Summary of Analytical Results - Metals
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well	Date	Aluminum		Antimony		Arsenic		Barium		Cadmium		Calcium		Chromium		Cobalt		Copper		Iron		Lead		Magnesium		Manganese		Mercury		Nickel		Potassium		Silver		Sodium		Vanadium		Zinc	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit[1]	100		0.024		0.2		NS		0.05		NS		1.0		NS		NS		5.0		0.1		NS		10		NS		NS		NS		0.511		NS		NS		10	
		Surface Water RG	NS		0.61		0.16		5		0.0023		NS		0.44		NS		0.026		1.0		0.064		NS		1.0		0.103		1.0		NS		0.005		NS		NS		1.0	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
L3	*Compliance/Downgradient*																																											
	SW777	5/20/2008	<0.2		0.0059	F /	<0.01		0.04		<0.002		74		<0.01		<0.005		0.0031	F /	<0.15		0.0019	F /	34		0.023		<0.0002		<0.01		1		<0.005		5.8		<0.005		0.0072	F /
		10/23/2008	0.024	F /	<0.02		<0.01		0.046		<0.002		85		<0.01		<0.005		0.0011	F /	0.021	F /	<0.005		38		0.024		<0.0002		<0.01		2.2		<0.005		14		0.004	F /	0.0042	F /
		5/7/2009	<0.2	U / UJ	<0.02	U / UJ	<0.01	U / UJ	0.036	/ J	<0.002	U / UJ	64	/ J	<0.01	U / UJ	0.0049	F / J	<0.01	U / UJ	<0.1	U / UJ	<0.005	U / UJ	27	/ J	0.033	/ J	<0.0002		<0.01	U / UJ	1.5	/ J	<0.005	U / UJ	11	/ J	<0.005	U / UJ	<0.02	U / UJ
		10/23/2009	0.53		<0.02		<0.01		0.033		<0.002		33		<0.01		0.0022	F /	0.004	F /	0.77		<0.005		14		0.089		<0.0002		0.0029	F /	5.4		<0.005		5.6		0.0036	F /	<0.02	
		4/9/2010	0.13	F / U	<0.020		<0.010		0.033		<0.0020		60		<0.010		0.0012	F /	0.0017	F /	0.13	F / U	0.0021	F / U	26		0.028		<0.0002		<0.010		1.9		<0.0050		11		0.0021	F /	0.0037	F /
		10/26/2010	<0.20		<0.020		<0.010		0.044		0.00058	F / U	72		<0.010		<0.0050		0.0015	F /	0.11	F /	<0.0050		38		0.092		0.00013	F / J	<0.010		3.9		<0.0050		14		<0.0050		<0.020	
		4/14/2011	<0.2		<0.02		<0.01		0.04		<0.002		75		<0.01		<0.005		<0.01		<0.2		0.0017	F /	34		0.039		<0.0002		<0.01		1.3		<0.005		14		0.003	F /	<0.02	
		10/14/2011	<0.20		<0.020		<0.010		0.031		0.00078	F /	61		<0.010		<0.0050		0.0018	F /	<0.20		<0.0050		34		0.071		<0.0002	U / UJ	0.00081	F /	2.7		<0.0050		19		<0.0050		<0.020	
		4/11/2012	<0.20		<0.020		<0.010		0.039		0.00087	F /	73		<0.010		<0.0050		0.0041	F / U	<0.20		<0.0050		39		0.06		<0.20		<0.010		1.4		<0.0050		14		<0.0050		0.0087	F /
		10/30/2012	<0.2		<0.02		<0.01		0.026		0.00076	F /	42		<0.01		<0.005		0.0029	F /	<0.2		0.0019	F /	35		0.0046	F /	<0.2		<0.01		3		<0.005		8.6		<0.005		0.0053	F /
		4/16/2013	0.018	F /	<0.02		<0.025		0.035		<0.005		59		<0.015		<0.015		0.002	F /	0.034	F /	<0.015		24		0.011		<0.0002		0.0014	F /	1.9	F /	<0.015		14		<0.015		<0.15	
		10/21/2013	<0.3		<0.02		<0.025		0.012		0.00047	F /	18		<0.015		<0.015		0.0047	F /	<0.1		<0.015		37		0.0011	F / B	<0.2		<0.04		<3		0.0012	F / B	18		<0.015		0.0052	F /
		10/23/2014	<0.3		<0.02		0.0062	F /	0.043		0.00048	F /	87		<0.015		<0.015		<0.015		<0.1		<0.015		38		0.026		<0.0002		<0.04		1.5	F /	<0.015		15		<0.015		<0.15	
		12/10/2014	<0.3		<0.02		<0.025		0.042		<0.005		94		<0.015		<0.015		<0.015		0.029	F /	<0.015		41		0.041		<0.0002		<0.04		1.3	F /	0.00096	F / B	15		0.0016	F /	<0.15	
	Downgradient																																											
	SW557	5/20/2008	<0.2		0.005	F /	<0.01		0.039		<0.002		74		<0.01		<0.005		0.0029	F /	<0.15		<0.005		34		0.039		<0.0002		<0.01		1.3		<0.005		13		<0.005		0.0048	F /
		10/23/2008	0.023	F /	<0.02		<0.01		0.046		<0.002		84		<0.01		<0.005		0.0013	F /	0.042	F /	<0.005		37		0.023		<0.0002		0.018		2.1		<0.005		13		0.0035	F /	0.0063	F /
		5/7/2009	0.031	F / J	<0.02	U / UJ	<0.01	U / UJ	0.045	/ J	<0.002	U / UJ	65	/ J	<0.01	U / UJ	0.0022	F / J	<0.01	U / UJ	<0.1	U / UJ	<0.005	U / UJ	27	/ J	0.028	/ J	<0.0002		0.0016	F / J	1.5	/ J	<0.005	U / UJ	11	/ J	0.0021	F / J	<0.02	U / UJ
		5/7/2009 (DUP)	<0.2	U / UJ	<0.02	U / UJ	<0.01	U / UJ	0.038	/ J	<0.002	U / UJ	67	/ J	<0.01	U / UJ	<0.005	U / UJ	<0.01	U / UJ	<0.1	U / UJ	<0.005	U / UJ	28	/ J	0.026	/ J	<0.0002		<0.01	U / UJ	1.6	/ J	<0.005	U / UJ	11	/ J	<0.005	U / UJ	<0.02	U / UJ
		10/23/2009	2	/ J	0.0036	F /	<0.01		0.043		<0.002		35		0.0031	F /	0.0015	F /	0.007	F /	2.8	/ J	0.0043	F /	15		0.13		<0.0002		0.0051	F /	5.8		<0.005		5.7		0.0066		0.012	F / U
		10/23/2009 (DUP)	3	/ J	<0.02		<0.01		0.046		<0.002		33		0.0045	F /	0.002	F /	0.0081	F /	4.1	/ J	0.0058		15		0.15		<0.0002		0.0067	F /	5.7		<0.005		5.3		0.0089		0.019	F / U
		4/9/2010	0.059	F / U	<0.020		<0.010		0.025		<0.0020		46		<0.010		<0.0050		<0.010		0.057	F / U	<0.0050		20	/ J	0.016		<0.0002		<0.010		1.4		<0.0050		8.9		0.0012	F /	<0.020	
		4/9/2010 (DUP)	0.077	F / U	<0.020		<0.010		0.032		<0.0020		59		<0.010		<0.0050		0.00094	F /	0.07	F / U	<0.0050		26	/ J	0.022		<0.0002		<0.010		1.8		<0.0050		11		0.0018	F /	<0.020	
		10/26/2010	<0.20		<0.020		<0.010		0.043		0.0007	F / U	78		<0.010		0.0015	F /	<0.010		0.051	F /	<0.0050		40		0.02		<0.0002		<0.010		2.8		<0.0050		15		<0.0050		0.0044	F /
		4/14/2011	<0.2		<0.02		<0.01		0.04		<0.002		75		0.0014	F /	<0.005		<0.01		<0.2		0.0024	F /	35		0.048		<0.0002		<0.01		1.4		<0.005		16		0.0028	F /	<0.02	
		10/14/2011	<0.20		<0.020		0.0046	F /	0.025		0.00062	F /	59		<0.010		<0.0050		<0.010		<0.20		<0.0050		35		0.0025	F /	<0.0002	U / UJ	<0.010		1.8		<0.0050		20		<0.0050		<0.020	
		4/10/2012	<0.20		<0.020		<0.010		0.039		0.00085	F /	75		<0.010		<0.0050		0.023	/ U	<0.20		<0.0050		39		0.072		<0.20		<0.010		1.4		<0.0050		15		<0.0050		<0.020	
		10/30/2012	<0.2		<0.02		<0.01		0.027		0.0008	F /	43		<0.01		<0.005		0.0025	F /	<0.2		<0.005		35		0.0013	F /	<0.2		<0.01		2.7		<0.005		8.7		<0.005		<0.02	
		4/16/2013	0.14	F /	<0.02		<0.025		0.035		<0.005		59		<0.015		<0.015		0.003	F /	0.16		<0.015		25		0.014		<0.0002		0.0014	F /	2	F /	<0.015		16		<0.015		<0.15	
		10/21/2013	<0.3		<0.02		<0.025		0.015		<0.002		24		<0.015		<0.015		0.0048	F /	0.026	F /	<0.015		28		0.0035	F /	<0.2		0.0018	F /	0.34	F /	<0.005		16		<0.015		0.0066	F /
		10/23/2014	<0.3		<0.02		<0.025		0.044		0.00057	F /	89		<0.015		<0.015		<0.015		<0.1		<0.015		39		0.027		<0.0002		<0.04		1.5	F /	<0.015		15		<0.015		<0.15	
		12/10/2014	<0.3		<0.02		<0.025		0.042		<0.005		95		<0.015		<0.015		<0.015		<0.1		<0.015		42		0.045		<0.0002		<0.04		1.3	F /	0.00096	F / B	16		0.0013	F /	<0.15	
	SW558	5/20/2008	<0.2		0.006	F /	<0.01		0.038		<0.002		72		<0.01		<0.005		0.0024	F /	<0.15		0.0018	F /	33		0.0093	F /	<0.0002		<0.01		0.98		<0.005		5.8		<0.005		0.0053	F /
		10/23/2008	0.049	F /	<0.02		<0.01		0.046		<0.002		87		<0.01		<0.005		0.0012	F /	0.022	F /	<0.005		39		0.024		<0.0002		<0.01		2.2		<0.005		14		0.0037	F /	0.0076	F /
		4/14/2011	<0.2		<0.02		<0.01		0.043		<0.002		74		<0.01		<0.005		<0.01		<0.2		0.0018	F /	33		0.0056	F /	<0.0002		<0.01		0.98		<0.005		5.4		0.0024	F /	<0.02	
		4/10/2012	<0.20		<0.020		<0.010		0.042		0.00079	F /	80		<0.010		<0.0050		0.0066	F / U	<0.20		<0.0050		43		0.0027	F /	<0.20		<0.010		1		<0.0050		6.2		<0.0050		<0.020	
		4/16/2013	0.051	F /	<0.02		<0.025		0.033		<0.005		49		<0.015		<0.015		0.0019	F /	0.064	F /	<0.015		20		0.0041	F /	<0.0002		<0.04		1.7	F /	<0.015		3.4	F /	<0.015		<0.15	
		10/23/2014	<0.3		<0.02		<0.025		0.045		<0.005		89		<0.015		<0.015		<0.015		0.035	F /	<0.015		38		0.0025	F /	<0.0002		<0.04		1.3	F /	<0.015		4.9	F /	<0.015		<0.15	
		12/10/2014	<0.3		<0.02		<0.025		0.045		<0.005		93		<0.015		<0.015		<0.015		<0.1		<0.015		41		0.0044	F /	<0.0002		<0.04		0.81	F /	0.0017	F / B	4.5	F /	0.0011	F /	<0.15	
M11	*Upgradient*																																											
	MW802	5/15/2008	<0.2		<0.02		<0.01		0.018		<0.002		120		<0.01		<0.005		0.0011	F /	<0.15		<0.005		76		0.039		<0.0002		<0.01		0.6		<0.005		15		0.0015	F /	0.0041	F /
		10/7/2008 (DUP)	<0.2		<0.02		<0.01		0.025		<0.002		71		<0.01		<0.005		0.001	F /	0.026	F /	<0.005		31		0.12		<0.0002		<0.01		0.86		<0.005		29		0.0025	F /	0.041	
		10/7/2008	0.038	F /	<0.02		<0.01		0.027		<0.002		77		<0.01		<0.005		<0.01		0.033	F /	<0.005		33		0.13		<0.0002		<0.01		0.97		<0.005		32		0.0029	F /	0.044	
		5/4/2009	<0.20		<0.020		<0.010		0.024		<0.0020		74		<0.010		0.0029	F /	0.0028	F /	0.14		<0.0050		32		0.23		<0.0002		<0.010		0.86		<0.0050		36		<0.0050		<0.020	
		10/27/2009	<0.20		<0.020		<0.010		0.037		<0.0020		94		<0.010		0.0024	F /	<0.010		0.69		<0.0050		44		0.8		<0.0002		0.0022	F /	1		<0.0050		34		0.0029	F /	<0.020	
		4/13/2010	<0.20		<0.020		<0.010		0.022		<0.0020		73		<0.010		<0.0050		<0.010		0.076	F /	<0.0050		34		0.4		<0.0002		<0.010		1.1		<0.0050		30		0.0018	F /	0.0047	F /
		10/28/2010	<0.20		<0.020		0.0027	F /	0.04		0.00042	F / U	93		<0.010		<0.0050		<0.010		3.6		<0.0050		40		0.63		<0.0002		<0.010		1.4		<0.0050		32		<0.0050		0.0039	F /
		4/15/2011	<0.2		<0.02		<0.01		0.033		<0.002		86		<0.01		<0.005		<0.01		0.14	F / U	<0.005		39		0.01		<0.0002		0.00081	F /	1.2	/ J	<0.005		25		0.0024	F /	<0.02	
		10/11/2011	<0.20		<0.020		<0.010		0.043		0.001	F / U	100		<0.010		<0.0050		0.0019	F /	1.4		<0.0050		46		0.64		0.000087	F / J	<0.010		2		<0.0050		27		<0.0050		<0.020	
		4/16/2012	<0.20		<0.020		<0.010		0.026		<0.0020		75		<0.010		<0.0050		0.0012	F /	<0.20		<0.0050		34		0.75		<0.20		0.0023	F /	2		<0.0050		19		0.0025	F /	0.0078	F /
		10/24/2012	<0.2		<0.02		<0.01		0.099		0.00098	F /	120		<0.01		<0.005		0.0018	F /	<0.2		<0.005		55		0.58		<0.2		<0.01		3.2		<0.005		33		0.00067	F /	<0.02	
		10/16/2013	<0.3		<0.02		<0.025		0.05		0.00063	F /	91		<0.015		<0.015		<0.015		<0.1		<0.015		42		0.069		<0.2		<0.04		1.8	F /	<0.005		22		<0.015		0.0045	F / B
		12/11/2014	<0.3		<0.02		<0.025		0.057		0.00079	F /	130		0.0008	F /	<0.015		0.002	F /	<0.1		<0.015		64		0.019		<0.0002		0.0018	F /	2	F /	<0.015		30		0.0011	F /	<0.15	
	MW803	10/7/2008	<0.2		<0.02		<0.01		0.028		<0.002		42		<0.01		<0.005		0.00093	F /	<0.15		<0.005		23		<0.01		<0.0002		<0.01		7.4		<0.005		97		0.0019	F /	0.018	F /
		5/4/2009	<0.20		<0.020		<0.010		0.028		<0.0020		43		<0.010		0.001	F /	<0.010		<0.10		<0.0050		23		<0.010		<0.0002		<0.010		6.7		<0.0050		100		<0.0050		<0.020	
		10/27/2009	<0.20		<0.020		<0.010		0.027		<0.0020		43		<0.010		<0.0050		<0.010		<0.10		<0.0050		25		<0.010		<0.0002		0.0018	F /	7.5		<0.0050		93		0.0022	F /	<0.020	
		4/13/2010	<0.20		<0.020		<0.010		0.027		<0.0020		44		<0.010		<0.0050		0.0012	F /	<0.20		<0.0050		26		<0.010		<0.0002		<0.010		7.6		<0.0050		90		0.0021	F /	0.0046	F /
		10/28/2010	<0.20		<0.020		<0.010		0.027		0.00039	F / U	45		<0.010		<0.0050		<0.010		<0.20		<0.0050		26		<0.010		<0.0002		<0.010		7		<0.0050		92		<0.0050		<0.020	
		4/15/2011	<0.2		<0.02		<0.01		0.027		<0.002		43		<0.01		<0.005		<0.01		<0.2		<0.005		26		<0.01		<0.0002		0.0015	F /	8.8	/ J	<0.005		83		0.0019	F /	<0.02	
		10/11/2011	<0.20		<0.020		<0.010		0.026		0.0008	F / U	43		<0.010		<0.0050		0.0019	F /	<0.20		<0.0050		25		<0.010		0.000093	F / J	<0.010		6.9		<0.0050		85		<0.0050		<0.020	
		10/24/2012	<0.2		<0.02		<0.01		0.028		0.0012	F /	47		<0.01		<0.005		<0.01		<0.2		<0.005		28		<0.01		<0.2		<0.01		7.3		<0.005		84		<0.005		<0.02	
		10/16/2013	<0.3		<0.02		<0.025		0.027		0.00055	F /	45		<0.015		<0.015		<0.015		<0.1		<0.015		28		0.00027	F /	<0.2		<0.04		7.2		<0.005		80		<0.015		0.0047	F / B
		12/15/2014	<0.3		<0.02		<0.025		0.028		<0.005		47		0.0007	F /	<0.015		<0.015		<0.1		<0.015		29		<0.01		<0.0002		0.0016	F /	7.6		<0.015		79		<0.015		<0.15	
	Downgradient																																											
	MW333	5/12/2008	<0.2		<0.02		<0.01		0.19		<0.002		49		<0.01		<0.005		<0.01		<0.15		<0.005		33		<0.01		<0.0002		<0.01		6.3		<0.005		34		<0.005		0.026	
		10/6/2008	<0.2		<0.02		<0.01		0.22		<0.002		52		<0.01		0.0014	F /	<0.01		0.72		<0.005		35		1		<0.0002		<0.01		6.6		<0.005		37		0.0029	F /	0.0065	F /
		5/5/2009	<0.20		<0.020		<0.010		0.17		<0.0020		50		<0.010		0.00072	F /	<0.010		0.074	F /	<0.0050		32		0.042		<0.0002		<0.010		6.6		<0.0050		44		<0.0050		<0.020	
		10/28/2009	<0.20		<0.020		<0.010		0.18		<0.0020		47		<0.010		0.00061	F /	<0.010		0.28		<0.0050		33		1.2		<0.0002		<0.010		6.4		<0.0050		38		0.0023	F /	<0.020	
		4/13/2010	<0.20		<0.020		<0.010		0.14		<0.0020		50		<0.010		<0.0050		0.0018	F /	<0.20		<0.0050		34		<0.010		<0.0002		<0.010		6.4		<0.0050		39		0.0021	F /	0.0038	F /
		10/28/2010	<0.20		<0.020		<0.010		0.16		0.00064	F / U	51		<0.010		0.0015	F /	<0.010		0.4		<0.0050		34		1		<0.0002		<0.010		6.6		<0.0050		45		<0.0050		0.006	F /
		4/18/2011	<0.20		0.0034	F /	<0.010		0.14		0.001	F / U	47		<0.010		<0.0050		<0.010		<0.20		<0.0050		33		<0.010		<0.0002		<0.010		6.7		<0.0050		45		<0.0050		<0.020	
		10/11/2011	<0.20		<0.020		<0.010		0.12		0.00083	F / U	49		<0.010		<0.0050		0.0016	F /	<0.20		<0.0050		33		0.099		<0.0002		<0.010		6.3		<0.0050		42		<0.0050		<0.020	
		10/24/2012	<0.2		<0.02		<0.01		0.1		0.00073	F /	51		<0.01		<0.005		<0.01		<0.2		<0.005		34		0.011		<0.2		<0.01		6.4		<0.005		43		<0.005		<0.02	
		10/16/2013	<0.3		<0.02		<0.025		0.096		0.0007	F /	51		<0.015		<0.015		<0.015		<0.1		<0.015		36		0.0021	F /	<0.2		<0.04		6.1		<0.005		40		<0.015		<0.15	
		12/15/2014	<0.3		<0.02		<0.025		0.084		<0.005		52		<0.015		<0.015		<0.015		<0.1		<0.015		35		0.00078	F /	<0.0002		<0.04		6.5		<0.015		43		<0.015		<0.15	

TABLE B2

Summary of Analytical Results - Metals
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well	Date	Aluminum		Antimony		Arsenic		Barium		Cadmium		Calcium		Chromium		Cobalt		Copper		Iron	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit(1)	100		0.024		0.2		NS		0.05		NS		1.0		NS		NS		5.0	
		Surface Water RG	NS		0.61		0.16		5		0.0023		NS		0.44		NS		0.026		1.0	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M11		*Downgradient*																				
	MW334	5/12/2008	<0.2		<0.02		<0.01		0.023		<0.002		160		<0.01		<0.005		<0.01		<0.15	
		10/6/2008	<0.2		<0.02		<0.01		0.034		<0.002		180		<0.01		0.0036	F /	<0.01		3.4	
		5/5/2009	<0.20		<0.020		<0.010		0.025		<0.0020		150		<0.010		0.0016	F /	<0.010		0.049	F /
		10/28/2009	<0.20		<0.020		0.0037	F /	0.039		<0.0020		150		<0.010		0.0047	F /	<0.010		**5.2**	
		4/13/2010	<0.20		<0.020		<0.010		0.027		<0.0020		150		<0.010		<0.0050		<0.010		<0.20	
		10/28/2010	<0.20		0.0043	F /	0.002	F /	0.034		0.00084	F / U	130		<0.010		0.003	F /	<0.010		3.4	
		4/18/2011	<0.20		0.0034	F /	<0.010		0.027		0.0013	F / U	120		<0.010		<0.0050		<0.010		0.056	F /
		10/11/2011	<0.20		0.0037	F /	<0.010		0.037		0.00099	F / U	110		<0.010		<0.0050		0.0017	F /	0.92	
		10/11/2011 (DUP)	<0.20		0.0039	F /	<0.010		0.037		0.0011	F / U	110		<0.010		<0.0050		0.0018	F /	0.71	
		10/24/2012	<0.2		<0.02		<0.01		0.038		0.0011	F /	110		<0.01		0.0012	F /	<0.01		2	
		10/16/2013	<0.3		<0.02		<0.025		0.045		0.00079	F /	100		<0.015		<0.015		<0.015		0.08	F /
		12/15/2014	<0.3		<0.02		<0.025		0.041		<0.005		93		<0.015		<0.015		<0.015		0.055	F /
	MW335	5/13/2008	0.024	F /	<0.02		<0.01		0.016		<0.002		260		<0.01		0.0011	F /	0.0028	F /	<0.15	
		10/7/2008	<0.2		<0.02		<0.01		0.021		<0.002		310		<0.01		<0.005		0.0053	F /	<0.15	
		10/7/2008 (DUP)	0.028	F /	<0.02		<0.01		0.02		<0.002		140		<0.01		0.0012	F /	<0.01		0.79	
		5/4/2009	<0.20		<0.020		<0.010		0.018		<0.0020		290		<0.010		0.001	F /	0.007	F /	<0.10	
		10/28/2009	<0.20		<0.020		<0.010		0.025		<0.0020		290		<0.010		0.0073		<0.010		0.051	F /
		4/13/2010	<0.20		<0.020		<0.010		0.017		<0.0020		260		<0.010		<0.0050		0.005	F /	<0.20	
		4/13/2010 (DUP)	<0.20		<0.020		<0.010		0.018		<0.0020		270		<0.010		<0.0050		0.005	F /	<0.20	
		10/28/2010	<0.20		0.0037	F /	<0.010		0.024		0.001	F / U	240		<0.010		<0.0050		0.0071	F /	<0.20	
		4/15/2011	<0.2		<0.02		<0.01		0.018		<0.002		200		<0.01		<0.005		0.004	F /	<0.2	
		10/12/2011	<0.20		<0.020		<0.010		0.022		0.001	F /	210		<0.010		<0.0050		0.0066	F /	0.042	F /
		4/16/2012	<0.20		<0.020		<0.010		0.021		<0.0020		210		<0.010		<0.0050		0.0051	F /	<0.20	
		10/24/2012	<0.2		<0.02		<0.01		0.027		0.0012	F /	200		<0.01		<0.005		0.0081	F /	<0.2	
		10/16/2013	<0.3		<0.02		<0.025		0.036		0.00081	F /	210		<0.015		0.0018	F /	<0.015		0.48	
		10/16/2013 (DUP)	<0.3		<0.02		<0.025		0.036		0.0011	F /	210		<0.015		0.0019	F /	<0.015		0.49	
		12/11/2014	<0.3		<0.02		0.0079	F /	0.038		0.00054	F /	200		0.0014	F /	0.0025	F /	<0.015		0.23	
		12/11/2014 (DUP)	<0.3		0.0034	F /	0.0073	F /	0.039		0.0005	F /	200		<0.015		0.0025	F /	0.0014	F /	0.21	
	MW336	5/13/2008	0.018	F /	<0.02		<0.01		0.019		<0.002		110		<0.01		<0.005		<0.01		0.11	F /
		10/7/2008	0.022	F /	<0.02		<0.01		0.02		<0.002		140		<0.01		0.0017	F /	<0.01		0.77	
		5/5/2009	<0.20		<0.020		<0.010		0.019		<0.0020		140		<0.010		<0.0050		<0.010		<0.10	
		5/5/2009 (DUP)	<0.20		<0.020		<0.010		0.019		<0.0020		140		<0.010		0.00047	F /	<0.010		<0.10	
		10/27/2009	<0.20		<0.020		<0.010		0.021		<0.0020		140		<0.010		0.0004	F /	<0.010		0.54	
		10/27/2009 (DUP)	<0.20		<0.020		<0.010		0.021		<0.0020		140		<0.010		<0.0050		<0.010		0.54	
		4/13/2010	<0.20		<0.020		<0.010		0.019		<0.0020		140		<0.010		<0.0050		<0.010		<0.20	
		10/28/2010	<0.20		0.0051	F /	<0.010		0.028		0.00084	F / U	140		<0.010		0.0014	F /	<0.010		1.2	
		4/18/2011	<0.20		0.0038	F /	<0.010		0.023		0.0013	F / U	130		<0.010		<0.0050		<0.010		0.096	F /
		10/12/2011	<0.20		<0.020		<0.010		0.029		0.0011	F /	130		<0.010		0.0046	F /	0.0018	F /	1.7	
		4/16/2012	<0.20		<0.020		<0.010		0.02		<0.0020		120		<0.010		<0.0050		0.0011	F /	0.15	F /
		10/24/2012	<0.2		<0.02		<0.01		0.024		0.001	F /	150		<0.01		0.0015	F /	0.0016	F /	0.24	
		10/24/2012 (DUP)	<0.2		0.0046	F /	<0.01		0.025		0.001	F /	160		<0.01		0.0018	F /	0.0014	F /	0.29	
		10/16/2013	<0.3		<0.02		<0.025		0.029		0.001	F /	180		<0.015		0.0071	F /	<0.015		1.9	
		12/11/2014	<0.3		<0.02		<0.025		0.025		0.00053	F /	140	/ J	<0.015		0.0014	F /	<0.015		0.17	
	MW804	5/15/2008	0.017	F /	<0.02		<0.01		0.025		<0.002		75		<0.01		<0.005		0.00086	F /	<0.15	
		10/6/2008	0.019	F /	<0.02		<0.01		0.031		<0.002		160		<0.01		<0.005		0.0034	F /	<0.15	
		5/7/2009	<0.2	U / UJ	<0.02	U / UJ	<0.01	U / UJ	0.019	/ J	<0.002	U / UJ	120	/ J	<0.01	U / UJ	0.0031	F / J	<0.01	U / UJ	<0.1	U / UJ
		10/27/2009	<0.20		<0.020		<0.010		0.028		<0.0020		130		<0.010		<0.0050		<0.010		<0.10	
		4/13/2010	<0.20		<0.020		<0.010		0.023		<0.0020		120		<0.010		<0.0050		<0.010		<0.20	
		10/28/2010	<0.20		<0.020		<0.010		0.066		0.00086	F / U	140		<0.010		0.0023	F /	<0.010		2	
		4/15/2011	<0.2		<0.02		<0.01		0.024		<0.002		100		<0.01		<0.005		0.0019	F /	<0.2	
		4/15/2011 (DUP)	<0.2		<0.02		<0.01		0.024		<0.002		100		<0.01		<0.005		0.0017	F /	<0.2	
		10/11/2011	<0.20		0.0028	F /	<0.010		0.042		0.0011	F / U	140		<0.010		<0.0050		0.0018	F /	0.44	
		10/24/2012	<0.2		0.0056	F /	<0.01		0.076		0.00074	F /	150		<0.01		0.0028	F /	0.0016	F /	1.7	
		10/16/2013	<0.3		<0.02		<0.025		0.052		0.00095	F /	140		<0.015		<0.015		<0.015		0.27	
		12/11/2014	<0.3		0.0038	F /	0.0067	F /	0.032		0.00058	F /	140		<0.015		<0.015		<0.015		0.11	
	MW805	10/6/2008	<0.2		<0.02		<0.01		0.029		<0.002		120		<0.01		<0.005		0.0011	F /	0.035	F /
		5/7/2009	<0.2	U / UJ	<0.02	U / UJ	<0.01	U / UJ	0.029	/ J	<0.002	U / UJ	120	/ J	<0.01	U / UJ	<0.005	U / UJ	<0.01	U / UJ	<0.1	U / UJ
		10/27/2009	<0.20		<0.020		<0.010		0.027		<0.0020		120		<0.010		<0.0050		<0.010		<0.10	
		4/13/2010	<0.20		<0.020		<0.010		0.031		<0.0020		130		<0.010		<0.0050		0.0012	F /	<0.20	
		11/2/2010	<0.20		<0.020		<0.010		0.036		0.00092	F / U	130		<0.010		0.0016	F /	<0.010		1.2	
		4/15/2011	<0.2		<0.02		<0.01		0.033		<0.002		120		<0.01		<0.005		0.0014	F /	<0.2	
		10/11/2011	<0.20		0.0029	F /	<0.010		0.03		0.001	F / U	120		<0.010		<0.0050		0.0023	F /	<0.20	
		4/16/2012	<0.20		<0.020		<0.010		0.028		<0.0020		110		<0.010		<0.0050		0.0016	F /	<0.20	
		10/24/2012	<0.2		<0.02		<0.01		0.029		0.00098	F /	110		<0.01		<0.005		0.0018	F /	0.099	F /
		10/16/2013	<0.3		<0.02		<0.025		0.037		0.00098	F /	110		<0.015		<0.015		<0.015		0.031	F /
		12/11/2014	<0.3		<0.02		0.012	F /	0.039		<0.005		120		0.0007	F /	<0.015		0.0014	F /	0.081	F /

Site	Well	Date	Lead		Magnesium		Manganese		Mercury		Nickel		Potassium		Silver		Sodium		Vanadium		Zinc	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit(1)	0.1		NS		10		NS		NS		NS		0.511		NS		NS		10	
		Surface Water RG	0.064		NS		1.0		0.103		1.0		NS		0.005		NS		NS		1.0	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M11		*Downgradient*																				
	MW334	5/12/2008	<0.005		110		0.024		<0.0002		<0.01		5.7		<0.005		28		<0.005		0.074	
		10/6/2008	<0.005		120		1.1		<0.0002		<0.01		6.5		<0.005		35		0.0053		0.01	F /
		5/5/2009	<0.0050		99		0.027		<0.0002		<0.010		5.6		<0.0050		40		<0.0050		<0.020	F / U
		10/28/2009	<0.0050		100		0.83		<0.0002		<0.010		6.3		<0.0050		42		0.0041	F /	<0.020	
		4/13/2010	<0.0050		100		0.056		<0.0002		<0.010		6.3		<0.0050		44		0.005		<0.020	
		10/28/2010	<0.0050		90		0.57		<0.0002		<0.010		5.7		0.00091	F / U	43		<0.0050		<0.020	
		4/18/2011	<0.0050		82		0.044		<0.0002		<0.010		5.4		<0.0050		49		<0.0050		<0.020	
		10/11/2011	<0.0050		77		0.76		0.00016	F / J	<0.010		5.3		<0.0050		46		<0.0050		<0.020	
		10/11/2011 (DUP)	<0.0050		79		0.75		0.00016	F / J	<0.010		5.4		<0.0050		47		<0.0050		<0.020	
		10/24/2012	<0.005		71		0.52		<0.2		<0.01		5.2		<0.005		46		0.00073	F /	<0.02	
		10/16/2013	<0.015		68		0.83		<0.2		<0.04		5		<0.005		45		<0.015		0.0057	F / B
		12/15/2014	<0.015		58		0.56		<0.0002		0.0013	F /	4.8		<0.015		41		<0.015		<0.15	
	MW335	5/13/2008	<0.005		220		0.083		<0.0002		0.0031	F /	5.3		<0.005		47		<0.005		0.06	
		10/7/2008	<0.005		220		0.1		<0.0002		0.0045	F /	6.1		<0.005		49		0.0071		0.032	
		10/7/2008 (DUP)	<0.005		95		0.13		<0.0002		0.0042	F /	5		<0.005		58		0.0054		0.0026	F /
		5/4/2009	<0.0050		230		<0.010		<0.0002		<0.010		4.6		<0.0050		60		<0.0050		<0.020	
		10/28/2009	<0.0050		200		1.4		<0.0002		0.011		5.2		<0.0050		48		0.0052		<0.020	
		4/13/2010	<0.0050		200		0.0088	F /	<0.0002		0.002	F /	4.9		<0.0050		50		0.0049	F /	<0.020	
		4/13/2010 (DUP)	<0.0050		200		0.0086	F /	<0.0002		0.0024	F /	5.1		<0.0050		51		0.0061		<0.020	
		10/28/2010	<0.0050		170		0.29		<0.0002		0.0041	F /	4.7		<0.0050		53		<0.0050		0.0047	F /
		4/15/2011	<0.005		140		<0.01		<0.0002		0.0018	F /	5.9	/ J	<0.005		42		0.0032	F /	0.0079	F /
		10/12/2011	<0.0050		140		0.057		<0.0002		0.0011	F /	5.1		<0.0050		49		<0.0050		<0.020	
		4/16/2012	<0.0050		140		<0.010		<0.20		0.0024	F /	6.4		<0.0050		48		0.0047	F /	0.0047	F /
		10/24/2012	<0.005		120		0.076		<0.2		0.0037	F /	6.6		<0.005		51		<0.005		0.0051	F /
		10/16/2013	<0.015		120		2.8		<0.2		0.0017	F /	8.1		<0.005		58		0.0013	F /	<0.15	
		10/16/2013 (DUP)	<0.015		120		2.9		<0.2		0.0016	F /	8.1		<0.005		60		0.0016	F /	<0.15	
		12/11/2014	<0.015		120		2		<0.0002		0.0038	F /	8.5		<0.015		61		0.0014	F /	0.0061	F /
		12/11/2014 (DUP)	<0.015		130		2.1		<0.0002		0.0037	F /	8.8		0.00099	F /	62		0.0012	F /	<0.15	
	MW336	5/13/2008	<0.005		78		0.042		<0.0002		<0.01		4.2		<0.005		51		0.0013	F /	0.034	
		10/7/2008	<0.005		93		0.13		<0.0002		0.0042	F /	4.9		<0.005		57		0.0058		0.004	F /
		5/5/2009	<0.0050		96		0.0077	F /	<0.0002		<0.010		4.2		<0.0050		73		<0.0050		<0.020	
		5/5/2009 (DUP)	<0.0050		97		0.0051	F /	<0.0002		<0.010		4.1		<0.0050		71		<0.0050		<0.020	
		10/27/2009	<0.0050		91		0.14		<0.0002		<0.010		4.2		<0.0050		60		0.0044	F /	<0.020	
		10/27/2009 (DUP)	<0.0050		91		0.14		<0.0002		0.0016	F /	4.3		<0.0050		61		0.0042	F /	<0.020	
		4/13/2010	<0.0050		95		0.007	F /	<0.0002		0.002	F /	4.4		<0.0050		63		0.0038	F /	<0.020	
		10/28/2010	<0.0050		94		0.36		<0.0002		<0.010		4.6		<0.0050		69		<0.0050		<0.020	
		4/18/2011	<0.0050		85		0.019		<0.0002		<0.010		4.1		<0.0050		67		<0.0050		<0.020	
		10/12/2011	<0.0050		87		0.42		<0.0002		0.0029	F /	4.1		<0.0050		63		<0.0050		<0.020	
		4/16/2012	<0.0050		80		0.033		<0.20		<0.010		4.1		<0.0050		56		0.004	F /	0.0069	F /
		10/24/2012	<0.005		110		0.15		<0.2		0.0036	F /	4.6		<0.005		77		<0.005		<0.02	
		10/24/2012 (DUP)	<0.005		110		0.16		<0.2		0.0047	F /	4.8		<0.005		79		<0.005		0.0056	F /
		10/16/2013	<0.015		130		0.61		<0.2		0.0032	F /	6.1		<0.005		97		0.0011	F /	<0.15	
		12/11/2014	<0.015		94		0.33	/ J	<0.0002		0.0035	F /	4.8		<0.015		70		0.0012	F /	<0.15	
	MW804	5/15/2008	<0.005		35		0.31		<0.0002		<0.01		0.62		<0.005		26		0.0014	F /	0.0031	F /
		10/6/2008	<0.005		100		0.036		<0.0002		0.0038	F /	2.4		<0.005		32		0.0059		0.059	
		5/7/2009	<0.005	U / UJ	72	/ J	0.038	/ J	<0.0002		<0.01	U / UJ	0.67	/ J	<0.005	U / UJ	17	/ J	<0.005	U / UJ	<0.02	U / UJ
		10/27/2009	<0.0050		82		0.039		<0.0002		0.0019	F /	1.8		<0.0050		27		0.0038	F /	<0.020	
		4/13/2010	<0.0050		77		0.12		<0.0002		<0.010		0.54	/ J	<0.0050		14		0.0042	F /	0.0043	F /
		10/28/2010	<0.0050		110		0.58		<0.0002		0.0024	F /	4.2		<0.0050		49		<0.0050		<0.020	
		4/15/2011	<0.005		64		<0.01		<0.0002		0.0015	F /	0.82	/ J	<0.005		15		0.0032	F /	<0.02	
		4/15/2011 (DUP)	<0.005		62		<0.01		<0.0002		0.0012	F /	0.78	/ J	<0.005		15		0.0036	F /	<0.02	
		10/11/2011	<0.0050		90		0.088		0.00011	F / J	0.0027	F /	2.3		<0.0050		29		<0.0050		<0.020	
		10/24/2012	<0.005		110		0.53		<0.2		<0.01		5.3		0.0073		64		0.0063		<0.02	
		10/16/2013	<0.015		95		0.3		<0.2		0.0013	F /	5.1		<0.005		51		<0.015		0.0079	F / B
		12/11/2014	<0.015		87		0.04		<0.0002		0.0042	F /	1.2	F /	<0.015		24		0.0015	F /	<0.15	
	MW805	10/6/2008	<0.005		73		0.0092	F /	<0.0002		0.0076	F /	13		<0.005		100		0.005	F /	0.085	
		5/7/2009	<0.005	U / UJ	77	/ J	<0.01	U / UJ	<0.0002		0.0042	F / J	11	/ J	<0.005	U / UJ	130	/ J	<0.005	U / UJ	<0.02	U / UJ
		10/27/2009	<0.0050		78		<0.010		<0.0002		0.0048	F /	12		<0.0050		110		0.0042	F /	<0.020	
		4/13/2010	<0.0050		84		<0.010		<0.0002		0.005	F /	11	/ J	<0.0050		120		0.0042	F /	0.0044	F /
		11/2/2010	<0.0050		83		0.026		<0.0002		0.0034	F /	9.9		<0.0050		120		<0.0050		<0.020	
		4/15/2011	<0.005		82		<0.01		<0.0002		0.0055	F /	13	/ J	<0.005		120		0.0036	F /	<0.02	
		10/11/2011	<0.0050		79		0.004	F /	<0.0002		0.0029	F /	8.5		<0.0050		110		<0.0050		<0.020	
		4/16/2012	<0.0050		75		<0.010		<0.20		0.0059	F /	9.5		<0.0050		97		0.0037	F /	0.0078	F /
		10/24/2012	<0.005		79		0.0094	F /	<0.2		0.004	F /	8.1		<0.005		100		<0.005		<0.02	
		10/16/2013	<0.015		82		0.062		<0.2		<0.04		8.8		<0.005		110		<0.015		<0.15	
		12/11/2014	<0.015		87		0.037		<0.0002		0.0016	F /	9.2		<0.015		110		<0.015		<0.15	

TABLE B2

Summary of Analytical Results - Metals
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Analyte	Aluminum		Antimony		Arsenic		Barium		Cadmium		Calcium		Chromium		Cobalt		Copper	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit[1]	100		0.024		0.2		NS		0.05		NS		1.0		NS		NS	
		Surface Water RG	NS		0.61		0.16		5		0.0023		NS		0.44		NS		0.026	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M13		*Upgradient*																		
	MW806	5/15/2008	<0.2		<0.02		<0.01		0.095		<0.002		80		<0.01		<0.005		<0.01	
		8/19/2008	<0.2		<0.02		<0.01		0.093		<0.002		78		<0.01		<0.005		0.0012	F /
		10/21/2008	0.016	F /	<0.02		<0.01		0.1		<0.002		77		<0.01		<0.005		<0.01	
		2/4/2009	<0.20		<0.020		<0.010		0.094		<0.0020		77		<0.010		<0.0050		<0.010	
		5/5/2009	<0.20		<0.020		<0.010		0.099		<0.0020		77		<0.010		<0.0050		<0.010	
		7/29/2009	<0.2		0.0027	F /	<0.01		0.091		<0.002		78		<0.01		0.0018	F /	<0.01	
		10/28/2009	<0.20		<0.020		<0.010		0.093		<0.0020		75		<0.010		<0.0050		<0.010	
		1/15/2010	<0.20		<0.020		<0.010		0.093		<0.0020		73		<0.010		0.0043	F /	<0.010	
		4/14/2010	<0.20		<0.020		<0.010		0.098		<0.0020		82		<0.010		<0.0050		0.001	F /
		7/21/2010	<0.20		<0.020		<0.010		0.092		<0.0020		83		<0.010		<0.0050		<0.010	
		10/28/2010	<0.20		<0.020		<0.010		0.099		0.00045	F / U	77		<0.010		<0.0050		<0.010	
		1/27/2011	0.083	F /	<0.020		<0.010		0.085		<0.0020		72		<0.010		<0.0050		0.0015	F /
		4/19/2011	<0.20		0.0029	F /	<0.010		0.095		0.001	F / U	80		<0.010		<0.0050		<0.010	
		7/28/2011	<0.20		<0.020		<0.010		0.096		0.00069	F / U	77		<0.010		<0.0050		<0.010	
		10/12/2011	<0.20		<0.020		<0.010		0.091		0.00098	F /	75		<0.010		<0.0050		<0.010	
		2/29/2012	<0.20		<0.020		<0.010		0.096		<0.0020		76		0.001	F /	<0.0050		<0.010	
		4/16/2012	<0.20		<0.020		<0.010		0.082		0.00068	F /	68		<0.010		<0.0050		<0.010	
		7/17/2012	<0.2		<0.02		<0.01		0.1		0.00078	F /	81		<0.01		<0.005		0.0014	F /
		10/24/2012	<0.2		<0.02		<0.01		0.097		0.00097	F /	79		<0.01		<0.005		0.0013	F /
		1/31/2013	<0.3		<0.02		<0.025		0.095		0.00073	F /	76		<0.015		<0.015		<0.015	
		1/31/2013 (DUP)	<0.3		0.0039	F /	<0.025		0.098		0.00073	F /	78		<0.015		<0.015		<0.015	
		4/9/2013	<0.3		<0.02		<0.025		0.096		0.0006	F /	76		<0.015		<0.015		0.0027	F /
		7/31/2013	<0.3		<0.02		<0.025		0.093		0.00067	F /	75		<0.015		<0.015		<0.015	
		10/15/2013	<0.3		<0.02		<0.025		0.095		<0.002		76		<0.015		<0.015		<0.015	
		10/21/2014	<0.3		<0.02		0.0059	F / B	0.1		<0.005		83		<0.015		<0.015		0.0016	F /
		11/19/2014	<0.3		0.0033	F /	<0.025		0.094		<0.005		77		<0.015		<0.015		<0.015	
		12/16/2014	<0.3		<0.02		<0.025		0.1		<0.005		83		<0.015		<0.015		<0.015	
	MW807	5/15/2008	0.02	F /	<0.02		<0.01		0.094		<0.002		180		<0.01		0.0024	F /	<0.01	
		5/15/2008 (DUP)	0.018	F /	<0.02		<0.01		0.089		<0.002		170		<0.01		0.0017	F /	<0.01	
		8/19/2008	<0.2		<0.02		<0.01		0.023		<0.002		43		<0.01		<0.005		0.0036	F /
		8/19/2008 (DUP)	<0.2		<0.02		<0.01		0.021		<0.002		40		<0.01		<0.005		0.0024	F /
		10/21/2008	<0.2		<0.02		<0.01		0.1		<0.002		190		<0.01		0.0014	F /	<0.01	
		2/4/2009	0.018	F /	<0.020		<0.010		0.096		<0.0020		180		<0.010		0.0013	F /	<0.010	
		5/5/2009	<0.20		<0.020		<0.010		0.095		<0.0020		180		<0.010		0.00053	F /	<0.010	
		7/29/2009	<0.2		0.0028	F /	<0.01		0.097		<0.002		190		<0.01		0.0012	F /	<0.01	
		10/28/2009	<0.20		<0.020		<0.010		0.11		<0.0020		190		<0.010		0.00044	F /	<0.010	
		1/15/2010	<0.20		<0.020		<0.010		0.095		<0.0020		180		<0.010		0.0034	F /	<0.010	
		4/14/2010	<0.20		<0.020		<0.010		0.1		<0.0020		200		<0.010		<0.0050		<0.010	
		7/21/2010	<0.20		<0.020		<0.010		0.094		<0.0020		190		<0.010		<0.0050		<0.010	
		10/28/2010	<0.20		0.0039	F /	<0.010		0.087		0.00084	F / U	170		<0.010		<0.0050		0.0016	F /
		1/27/2011	<0.20		<0.020		<0.010		0.085		<0.0020		170		<0.010		<0.0050		<0.010	
		4/19/2011	<0.20		0.0097	F /	<0.010		0.09		0.0011	F / U	180		0.0022	F /	<0.0050		0.0032	F /
		7/28/2011	<0.20		<0.020		<0.010		0.093		0.001	F / U	180		<0.010		<0.0050		<0.010	
		10/12/2011	<0.20		0.0032	F /	<0.010		0.089		0.00099	F /	180		<0.010		<0.0050		0.0029	F /
		2/29/2012	0.026	F /	0.003	F / U	<0.010		0.097		<0.0020		180		<0.010		<0.0050		<0.010	
		4/16/2012	<0.20		<0.020		<0.010		0.088		0.00098	F /	160		<0.010		<0.0050		<0.010	
		7/17/2012	<0.2		0.0031	F /	<0.01		0.095		0.0012	F /	180		<0.01		<0.005		0.0022	F /
		10/24/2012	<0.2		0.0033	F /	<0.01		0.094		0.0009	F /	180		<0.01		<0.005		0.0014	F /
		1/31/2013	<0.3		<0.02		<0.025		0.093		0.00092	F /	180		<0.015		<0.015		<0.015	
		4/9/2013	<0.3		<0.02		<0.025		0.096		0.00078	F /	170		<0.015		<0.015		<0.015	
		7/31/2013	<0.3		0.0037	F /	<0.025		0.086		0.00078	F /	170		<0.015		<0.015		<0.015	
		10/15/2013	<0.3		<0.02		<0.025		0.094		0.00078	F /	190		<0.015		<0.015		<0.015	
		10/21/2014	<0.3		<0.02		<0.025		0.12		<0.005		230		<0.015		0.0012	F /	0.0034	F /
		11/19/2014	<0.3	U / UJ	<0.02		<0.025		0.12		<0.005		230		<0.015		<0.015		0.002	F /
		12/16/2014	<0.3		0.0032	F /	0.012	F / B	0.12		0.00061	F /	220		<0.015		<0.015		0.0016	F /
		Downgradient																		
	MW126R	5/20/2008	<0.2		0.0052	F /	<0.01		0.058		<0.002		71		<0.01		<0.005		0.0024	F /
		8/20/2008	<0.2		<0.02		<0.01		<0.01		<0.002		3.4		<0.01		<0.005		0.0012	F /
		10/22/2008	0.02	F /	<0.02		<0.01		0.00087	F /	<0.002		0.08	F /	<0.01		<0.005		0.0049	F /
		2/5/2009	<0.20		<0.020		<0.010		0.055		<0.0020		68		<0.010		<0.0050		<0.010	
		5/5/2009	<0.20		<0.020		<0.010		0.056		<0.0020		73		<0.010		<0.0050		<0.010	
		7/28/2009	<0.20		<0.020		<0.010		0.058		<0.0020		72		<0.010		<0.0050		<0.010	
		10/29/2009	<0.20		<0.020		<0.010		0.066		<0.0020		79		<0.010		<0.0050		<0.010	
		1/14/2010	<0.20		0.0039	F / U	<0.010		0.13		<0.0020		120		<0.010		0.0026	F / U	<0.010	
		4/14/2010	<0.20		<0.020		<0.010		0.099		<0.0020		97		<0.010		<0.0050		<0.010	
		4/14/2010 (DUP)	<0.20		<0.020		<0.010		0.098		<0.0020		97		<0.010		<0.0050		0.0013	F /
		7/20/2010	<0.20		<0.020		<0.010		0.064		<0.0020		77		0.0015	F /	<0.0050		<0.010	
		10/28/2010	<0.20		<0.020		<0.010		0.086		0.00066	F / U	92		<0.010		<0.0050		0.0032	F /
		1/28/2011	<0.20		<0.020		<0.010		0.069		<0.0020		78		<0.010		<0.0050		<0.010	
		4/19/2011	<0.20		<0.020		<0.010		0.062		0.00099	F / U	75		<0.010		<0.0050		0.0014	F /
		7/28/2011	<0.20		0.0034	F /	<0.010		0.058		0.00089	F / U	72		<0.010		<0.0050		<0.010	
		10/13/2011	<0.20		<0.020		<0.010		0.057		0.00091	F /	68		<0.010		<0.0050		0.064	
		2/29/2012	<0.20		<0.020		<0.010		0.055		<0.0020		67		<0.010		<0.0050		<0.010	
		4/16/2012	<0.20		<0.020		<0.010		0.048		0.00078	F /	61		<0.010		<0.0050		<0.010	
		7/17/2012	<0.2		<0.02		<0.01		0.054		0.00079	F /	69		<0.01		<0.005		0.0014	F /
		10/25/2012	<0.2		0.0036	F / U	<0.01		0.058		<0.002		70		0.0011	F / U	<0.005		<0.01	
		1/30/2013	<0.3		<0.02		<0.025		0.058		<0.005		79		<0.015		<0.015		0.0017	F /
		4/9/2013	<0.3		<0.02		<0.025		0.053		0.00054	F /	68		<0.015		<0.015		<0.015	
		7/31/2013	<0.3		<0.02		<0.025		0.053		0.00046	F /	65		<0.015		<0.015		<0.015	
		10/15/2013	<0.3		<0.02		<0.025		0.055		0.00049	F /	67		<0.015		<0.015		<0.015	
		10/21/2014	<0.3		<0.02		<0.025		0.06		<0.005		74		<0.015		<0.015		0.0019	F /
		11/19/2014	<0.3		<0.02		<0.025		0.063		<0.005		75		<0.015		<0.015		0.0042	F /
		12/16/2014	<0.3		<0.02		<0.025		0.059		<0.005		76		<0.015		<0.015		<0.015	

		Analyte	Iron		Lead		Magnesium		Manganese		Mercury		Nickel		Potassium		Silver		Sodium		Vanadium		Zinc	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit[1]	5.0		0.1		NS		10		NS		NS		NS		0.511		NS		NS		10	
		Surface Water RG	1.0		0.064		NS		1.0		0.103		1.0		NS		0.005		NS		NS		1.0	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M13		*Upgradient*																						
	MW806	5/15/2008	<0.15		<0.005		46		0.053		<0.0002		<0.01		2.8		<0.005		24		<0.005		0.013	F /
		8/19/2008	0.058	F /	<0.005		46		0.051		<0.0002		<0.01		2.3		<0.005		25		0.002	F /	0.0047	F /
		10/21/2008	0.61		0.0032	F /	46		0.038		<0.0002		<0.01		2		<0.005		24		0.0043	F /	0.024	
		2/4/2009	<0.10		<0.0050		46		0.013		<0.0002		<0.010		1.9	/ J	<0.0050		24		0.0041	F /	<0.020	F / U
		5/5/2009	<0.10		<0.0050		44		<0.010		<0.0002		<0.010		2.1		<0.0050		28		<0.0050		<0.020	
		7/29/2009	0.12		0.0058	/ U	46		0.077		<0.0002		<0.01		1.9	/ J	<0.005		24		0.0032	F /	<0.02	
		10/28/2009	0.26		<0.0050		44		0.03		<0.0002		<0.010		1.9	/ J	<0.0050		23		0.0024	F /	<0.020	
		1/15/2010	<0.10		<0.0050		45		0.0061	F /	<0.0002		0.0014	F /	1.9	/ J	<0.0050		24		0.0035	F /	<0.020	
		4/14/2010	<0.20		<0.0050		49		0.00057	F /	<0.0002		<0.010		2	/ J	<0.0050		25		0.0036	F /	<0.020	
		7/21/2010	0.11	F / U	<0.0050		48		0.06		<0.0002		<0.010		1.8		<0.0050		25		0.003	F /	0.005	F / U
		10/28/2010	0.79		<0.0050		44		0.021		<0.0002		<0.010		1.9		<0.0050		25		<0.0050		0.0035	F /
		1/27/2011	<0.20		<0.0050		43	/ J	0.0073	F /	<0.0002		<0.010		2.3		<0.0050		27	/ J	0.0019	F /	0.036	
		4/19/2011	<0.20		<0.0050		45		0.001	F /	<0.0002		<0.010		2		<0.0050		26		<0.0050		0.011	F /
		7/28/2011	0.27		<0.0050		44		0.063		<0.0002		<0.010		1.8		<0.0050		25		<0.0050		<0.020	
		10/12/2011	0.68		<0.0050		43		0.032		<0.0002		<0.010		1.8		<0.0050		24		<0.0050		<0.020	
		2/29/2012	<0.20		<0.0050		46		0.0017	F /	<0.20		<0.010		2.1	/ J	<0.0050		24		0.0031	F /	<0.020	
		4/16/2012	<0.20		<0.0050		40	/ J	0.0024	F /	<0.20	U / UJ	<0.010		1.6		<0.0050		22	/ J	<0.0050		0.013	F /
		7/17/2012	0.65		<0.005		46		0.025			U / R	<0.01		1.9		<0.005		24		<0.005		<0.02	
		10/24/2012	0.089	F /	<0.005		45		0.021		<0.2		<0.01		1.9		<0.005		26		<0.005		<0.02	
		1/31/2013	0.15		<0.015		45		0.0069	F /	<0.0002		<0.04		1.9	F /	<0.015		26		<0.015		<0.15	
		1/31/2013 (DUP)	0.16		<0.015		46		0.0069	F /	<0.0002		<0.04		2.1	F /	<0.015		27		<0.015		<0.15	
		4/9/2013	0.022	F /	<0.015		45		0.0046	F /	<0.0002		<0.04		2	F /	<0.015		28		0.0011	F /	<0.15	
		7/31/2013	<0.1		<0.015		45		0.025		<0.2		<0.04		1.8	F / B	<0.005		26		<0.015		<0.15	
		10/15/2013	0.26		<0.015		45		0.039		<0.2		<0.04		1.9	F /	<0.005		26		<0.015		<0.15	
		10/21/2014	0.36		<0.015		48		0.045		<0.0002		0.0015	F /	2.1	F /	<0.015		28		<0.015		<0.15	
		11/19/2014	<0.1		<0.015		44		0.0091	F /	<0.0002		<0.04		1.8	F /	0.0013	F / B	26		<0.015		<0.15	
		12/16/2014	<0.1		<0.015		45		0.0098	F /	<0.0002		<0.04		1.9	F /	<0.015		28		<0.015		<0.15	
	MW807	5/15/2008	0.69		<0.005		86		0.14		<0.0002		0.0056	F /	15		<0.005		310		0.0017	F /	0.11	
		5/15/2008 (DUP)	0.55		<0.005		81		0.13		<0.0002		0.0045	F /	13		<0.005		300		0.0019	F /	0.1	
		8/19/2008	<0.15		<0.005		21		<0.01		<0.0002		0.0051	F /	13		<0.005		66		0.0017	F /	0.013	F /
		8/19/2008 (DUP)	<0.15		<0.005		19		0.0029	F /	<0.0002		0.0038	F /	12		<0.005		65		<0.005		0.011	F /
		10/21/2008	0.77		<0.005		91		0.11		<0.0002		0.0031	F /	11		<0.005		350		0.0062		0.019	F /
		2/4/2009	1.3		<0.0050		91		0.079		<0.0002		<0.010		14	/ J	<0.0050		330		0.0049	F /	<0.020	
		5/5/2009	1.1		<0.0050		87		0.083		<0.0002		<0.010		9.1		<0.0050		350		<0.0050		<0.020	
		7/29/2009	1.1		<0.005		97		0.096		<0.0002		0.0021	F /	14	/ J	<0.005		400		0.0041	F /	<0.02	
		10/28/2009	1		<0.0050		97		0.097		<0.0002		0.002	F /	13	/ J	<0.0050		390		0.004	F /	0.018	F / U
		1/15/2010	1.3		<0.0050		91		0.079		<0.0002		0.0021	F /	15	/ J	<0.0050		410		0.0046	F /	<0.020	
		4/14/2010	1.3		<0.0050		100		0.08		<0.0002		<0.010		15	/ J	<0.0050		410		0.004	F /	<0.020	
		7/21/2010	0.98		<0.0050		96		0.096		<0.0002		0.0021	F /	14		<0.0050		380		0.0034	F /	0.0036	F / U
		10/28/2010	1.1		<0.0050		86		0.069		<0.0002		<0.010		9.9		<0.0050		370		<0.0050		<0.020	
		1/27/2011	1.1		<0.0050		82	/ J	0.068		<0.0002		<0.010		15		<0.0050		360	/ J	0.0033	F /	<0.020	
		4/19/2011	0.91		0.0037	F /	84		0.1		<0.0002		<0.010		8.3		<0.0050		380		0.0022	F /	0.017	F /
		7/28/2011	1		<0.0050		90		0.086		<0.0002		0.0016	F /	9.5		<0.0050		400		<0.0050		<0.020	
		10/12/2011	0.81		<0.0050		88		0.097		<0.0002		<0.010		8.6		<0.0050		410		<0.0050		<0.020	
		2/29/2012	0.82		0.0017	F / U	89		0.092		<0.20		0.0021	F /	14	/ J	<0.0050		400		0.004	F /	<0.020	
		4/16/2012	0.59		<0.0050		79	/ J	0.11		<0.20	U / UJ	0.0025	F /	7.2		<0.0050		380	/ J	<0.0050		0.0095	F /
		7/17/2012	0.2		<0.005		89		0.15			U / R	0.0025	F /	7.6		<0.005		390		<0.005		<0.02	
		10/24/2012	0.5		<0.005		90		0.12		<0.2		0.0021	F /	7.6		<0.005		390		<0.005		<0.02	
		1/31/2013	0.41		<0.015		85		0.13		<0.0002		0.0031	F /	8		<0.015		420		0.0012	F /	<0.15	
		4/9/2013	0.34		<0.015		86		0.14		<0.0002		0.0033	F /	7.9		<0.015		440		0.0016	F /	<0.15	
		7/31/2013	0.76		<0.015		85		0.087		<0.2		0.0014	F /	8.7		<0.005		370		<0.015		<0.15	
		10/15/2013	0.36		<0.015		93		0.14		<0.2		0.0021	F /	8.2		<0.005		430		<0.015		<0.15	
		10/21/2014	0.75		<0.015		110		0.16		<0.0002		0.004	F /	9.5		<0.015		650		0.0017	F /	<0.15	
		11/19/2014	0.64		<0.015		110		0.15	/ J	<0.0002		0.0035	F /	9.2		0.001	F / B	620		0.0014	F /	0.0051	F / J
		12/16/2014	0.79		<0.015		99		0.14		<0.0002		0.0032	F /	9.5		<0.015		630		<0.015		<0.15	
		Downgradient																						
	MW126R	5/20/2008	<0.15		0.0018	F /	46		0.0041	F /	<0.0002		<0.01		2.6		<0.005		25		<0.005		0.011	F /
		8/20/2008	<0.15		<0.005		0.91		<0.01		<0.0002		<0.01		0.082	F /	<0.005		2		<0.005		0.0042	F /
		10/22/2008	0.039	F /	0.0028	F /	<0.1		<0.01		<0.0002		<0.01		<0.5		<0.005		<1		<0.005		0.0058	F /
		2/5/2009	<0.10	F / U	<0.0050		43		0.0089	F /	<0.0002		<0.010		2.2	/ J	<0.0050		24		0.0033	F /	<0.020	F / U
		5/5/2009	<0.10		<0.0050		43		0.0069	F /	<0.0002		<0.010		2		<0.0050		27		<0.0050		<0.020	
		7/28/2009	0.18		<0.0050		45		0.022		<0.0002		<0.010		2.2		<0.0050		27	/ J	0.0024	F /	<0.020	
		10/29/2009	0.052	F /	<0.0050		46		0.03		<0.0002		<0.010		2.6	/ J	<0.0050		30		0.003	F /	<0.020	
		1/14/2010	<0.10		<0.0050		64		0.022		<0.0002		0.0022	F /	4.5	/ J	<0.0050		140		0.0041	F /	<0.020	
		4/14/2010	<0.20		<0.0050		49		0.00056	F /	<0.0002		<0.010		4.1	/ J	<0.0050		200		0.0032	F /	<0.020	
		4/14/2010 (DUP)	<0.20		<0.0050		50		<0.010		<0.0002		<0.010		3.9	/ J	<0.0050		200		0.0025	F /	<0.020	
		7/20/2010	0.091	F / U	<0.0050		45		0.03		<0.0002		0.0018	F /	2.3		0.0009	F /	47		0.0027	F /	0.0068	F / U
		10/28/2010	<0.20		<0.0050		45		0.015		<0.0002		<0.010		3.3		<0.0050		46		<0.0050		0.0051	F /
		1/28/2011	<0.20		<0.0050		44		0.0058	F /	<0.0002		<0.010		3	/ J	<0.0050		38		0.0021	F /	<0.020	
		4/19/2011	<0.20		<0.0050		44		0.0027	F /	<0.0002		<0.010		2.5		<0.0050		42		<0.0050		0.021	
		7/28/2011	0.14	F /	<0.0050		43		0.025		<0.0002		<0.010		2		<0.0050		32		<0.0050		<0.020	
		10/13/2011	0.19	F /	<0.0050		43		0.027		<0.0002		<0.010		2.3		<0.0050		28		<0.0050		0.04	
		2/29/2012	<0.20		0.0016	F / U	43		0.0088	F /	<0.20		<0.010		2.4	/ J	<0.0050		26		0.0029	F /	<0.020	
		4/16/2012	<0.20		<0.0050		39	/ J	0.0032	F /	<0.20	U / UJ	0.0022	F /	2		<0.0050		25	/ J	<0.0050		0.009	F /
		7/17/2012	0.12	F /	<0.005		43		0.019			U / R	<0.01		2.2		<0.005		24		<0.005		<0.02	
		10/25/2012	0.88		<0.005		44		0.023		<0.2		<0.01		2.4		<0.005		24		0.004	F /	<0.02	
		1/30/2013	<0.1		<0.015		49		0.022		<0.0002		0.0018	F /	3.1		<0.015		50		<0.015		0.0066	F /
		4/9/2013	0.045	F /	<0.015		44		0.02		<0.0002		<0.04		2.4	F /	<0.015		29		<0.015		<0.15	
		7/31/2013	<0.1		<0.015		41		0.0035	F /	<0.2		<0.04		1.9	F / B	<0.005		26		<0.015		<0.15	
		10/15/2013	0.17		<0.015		43		0.025		<0.2		<0.04		2.3	F /	<0.005		25		<0.015		<0.15	
		10/21/2014	0.14		<0.015		47		0.035		<0.0002		0.0015	F /	2.6	F /	<0.015		27		0.0012	F /	<0.15	
		11/19/2014	<0.1		<0.015		46		0.0019	F /	<0.0002		0.0014	F /	2.4	F /	0.0014	F / B	27		<0.015		0.0059	F /
		12/16/2014	0.038	F /	0.0027	F /	45	/ J	0.014		<0.0002		0.0015	F /	2.6	F /	<0.015		27		<0.015		<0.15	

TABLE B2

Summary of Analytical Results - Metals
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well	Analyte	Aluminum	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Silver	Sodium	Vanadium	Zinc
		Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
		Project Action Limit[1]	100	0.024	0.2	NS	0.05	NS	1.0	NS	NS	5.0	0.1	NS	10	NS	NS	NS	0.511	NS	NS	10
		Surface Water RG	NS	0.61	0.16	5	0.0023	NS	0.44	NS	0.026	1.0	0.064	NS	1.0	0.103	1.0	NS	0.005	NS	NS	1.0
Site	Well	Date	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF	Result LF/VF
M13												***Downgradient***										
	MW362	5/13/2008	0.032 F /	<0.02	<0.01	0.045	<0.002	140	<0.01	<0.005	<0.01	<0.15	<0.005	91	0.041	<0.0002	<0.01	7.9	<0.005	160	0.0012 F /	0.046
		8/20/2008	<0.2	<0.02	<0.01	<0.01	<0.002	3.4	<0.01	<0.005	<0.01	<0.15	<0.005	0.92	<0.01	<0.0002	<0.01	0.087 F /	<0.005	2	<0.005	0.0049 F /
		10/22/2008	<0.2	<0.02	<0.01	0.046	<0.002	170	<0.01	0.0013 F /	<0.01	<0.15	<0.005	99	0.11	<0.0002	0.0049 F /	7.5	<0.005	150	0.0056	0.016 F /
		2/5/2009	0.017 F /	<0.020	<0.010	0.048	<0.0020	170	<0.010	0.0014 F /	<0.010	<0.10 F / U	<0.0050	97	0.17	<0.0002	0.0037 F /	7.7 / J	<0.0050	190	0.0056	<0.020 F / U
		5/5/2009	<0.20	<0.020	<0.010	0.041	<0.0020	150	<0.010	<0.0050	<0.010	<0.10	<0.0050	89	0.016	<0.0002	<0.010	5.8	<0.0050	150	<0.0050	<0.020
		7/28/2009	<0.20	<0.020	<0.010	0.043	<0.0020	160	<0.010	0.0025 F /	<0.010	<0.10	<0.0050	97	0.059	<0.0002	0.0033 F /	7.7	<0.0050	160 / J	0.0045 F /	<0.020
		10/29/2009	<0.20	<0.020	<0.010	0.048	<0.0020	170	<0.010	0.0008 F /	<0.010	<0.10	<0.0050	100	0.17	<0.0002	0.0042 F /	7.9 / J	<0.0050	180	0.0037 F /	<0.020
		1/14/2010	<0.20	<0.020	<0.010	0.048	<0.0020	160	<0.010	0.00098 F / U	<0.010	<0.10	<0.0050	97	0.18	<0.0002	0.0046 F /	8.2 / J	<0.0050	220	0.004 F /	<0.020
		1/14/2010 (DUP)	<0.20	<0.020	<0.010	0.048	<0.0020	160	<0.010	0.004 F /	<0.010	<0.10	<0.0050	99	0.18	<0.0002	0.005 F /	8.3 / J	<0.0050	220	0.0044 F /	<0.020
		4/14/2010	<0.20	<0.020	<0.010	0.051	<0.0020	180	<0.010	<0.0050	<0.010	<0.20	<0.0050	110	0.088	<0.0002	0.0036 F /	8.9 / J	<0.0050	250	0.0045 F /	<0.020
		7/20/2010	<0.20	<0.020	<0.010	0.049	<0.0020	180	<0.010	<0.0050	<0.010	0.17 F / U	<0.0050	110	0.072	<0.0002	0.0029 F /	6.5	0.00094 F /	280	0.0032 F /	0.0075 F / U
		10/28/2010	<0.20	<0.020	<0.010	0.053	0.00059 F / U	180	<0.010	<0.0050	0.002 F /	0.088 F /	<0.0050	100	0.18	<0.0002	0.0031 F /	7	<0.0050	300	<0.0050	<0.020
		1/28/2011	<0.20	<0.020	<0.010	0.054	<0.0020	180	<0.010	<0.0050	<0.010	<0.20	<0.0050	100	0.23	<0.0002	0.004 F /	11 / J	<0.0050	340	0.0034 F /	<0.020
		4/19/2011	<0.20	0.0032 F /	<0.010	0.05	0.0014 F / U	180	<0.010	<0.0050	<0.010	<0.20	<0.0050	100	0.077	<0.0002	0.001 F /	6.8	<0.0050	290	<0.0050	0.013 F /
		7/28/2011	<0.20	0.0034 F /	<0.010	0.047	0.001 F / U	180	<0.010	<0.0050	0.0016 F /	<0.20	<0.0050	100	0.083	<0.0002	0.0029 F /	6.7	<0.0050	260	<0.0050	<0.020
		10/13/2011	<0.20	<0.020	<0.010	0.043	0.0012 F /	160	<0.010	0.00058 F /	<0.010	<0.20	<0.0050	99	0.083	<0.0002	0.0029 F /	6.2	<0.0050	220	<0.0050	<0.020
		2/29/2012	<0.20	0.0035 F / U	<0.010	0.044	<0.0020	160	0.001 F /	0.0011 F /	<0.010	<0.20	0.0016 F / U	100	0.043	<0.20	0.0044 F /	8.5 / J	<0.0050	180	0.0047 F /	<0.020
		4/16/2012	0.034 F /	<0.020	<0.010	0.041	0.00098 F /	150	<0.010	<0.0050	<0.010	0.14 F /	<0.0050	89 / J	0.078	<0.20 U / UJ	0.0042 F /	5.8	<0.0050	200 / J	<0.0050	<0.020
		4/16/2012 (DUP)	<0.20	<0.020	<0.010	0.042	0.001 F /	150	<0.010	<0.0050	<0.010	0.38	<0.0050	93 / J	0.078	<0.20 U / UJ	0.0063 F /	6	<0.0050	210 / J	<0.0050	0.011 F /
		7/17/2012	<0.2	0.0032 F /	<0.01	0.048	0.0011 F /	180	<0.01	<0.005	0.0022 F /	<0.2	<0.005	100	0.096	U / R	0.0035 F /	7	<0.005	270	<0.005	<0.02
		10/25/2012	<0.2	<0.02	<0.01	0.05	<0.002	180	<0.01	0.0011 F /	<0.01	<0.2	<0.005	110	0.18	<0.2	0.0051 F /	7.1	<0.005	300	0.0046 F /	<0.02
		1/30/2013	<0.3	<0.02	<0.025	0.051	<0.005	180	0.0007 F /	0.0012 F /	0.0022 F /	<0.1	<0.015	110	0.18	<0.0002	0.0065 F /	7.8	<0.015	320	<0.015	0.0046 F /
		4/9/2013	<0.3	<0.02	<0.025	0.043	0.00071 F /	160	<0.015	0.0012 F /	0.0016 F /	<0.1	<0.015	93	0.069	<0.0002	0.0039 F /	6.5	<0.015	280	0.0015 F /	<0.15
		4/19/2013 (DUP)	<0.3	<0.02	<0.025	0.043	0.00076 F /	150	<0.015	0.0012 F /	<0.015	<0.1	<0.015	94	0.069	<0.0002	0.0039 F /	6.6	<0.015	280	0.0017 F /	<0.15
		7/31/2013	<0.3	0.0036 F /	<0.025	0.044	0.00064 F /	160	<0.015	<0.015	<0.015	<0.1	<0.015	99	0.063	<0.2	0.0028 F /	6.5	<0.005	250	<0.015	<0.15
		10/15/2013	<0.3	<0.02	<0.025	0.05	0.00077 F /	180 / J	<0.015	<0.015	0.0017 F /	<0.1	<0.015	100	0.18	<0.2	0.0042 F /	7.2	<0.005	340	<0.015	<0.15
		10/15/2013 (DUP)	<0.3	<0.02	<0.025	0.05	0.00086 F /	180	<0.015	<0.015	<0.015	<0.1	<0.015	100	0.18	<0.2	0.0039 F /	7.6	<0.005	350	<0.015	<0.15
		10/21/2014	<0.3	<0.02	<0.025	0.053	<0.005	190	<0.015	0.0012 F /	0.0031 F /	<0.1	<0.015	110	0.18	<0.0002	0.0067 F /	7.7	<0.015	330	0.0017 F /	<0.15
		10/21/2014 (DUP)	<0.3	<0.02	<0.025	0.051	<0.005	190 / J	<0.015	<0.015	0.0033 F /	0.023 F /	<0.015	110	0.18	<0.0002	0.0067 F /	7.3	<0.015	320	0.0012 F /	<0.15
		11/19/2014	<0.3	0.0046 F /	<0.025	0.05	<0.005	190	<0.015	<0.015	<0.015	<0.1	<0.015	100	0.18	<0.0002	0.0058 F /	7	0.0018 F / B	360	<0.015	<0.15
		11/19/2014 (DUP)	<0.3	<0.02	<0.025	0.052	<0.005	190	<0.015	<0.015	0.0014 F /	<0.1	<0.015	110	0.19	<0.0002	0.006 F /	7.2	0.0017 F / B	370	<0.015	0.0045 F /
		12/16/2014	<0.3	<0.02	0.0076 F / B	0.055	<0.005	200	<0.015	<0.015	0.0018 F /	<0.1	<0.015	110	0.21	<0.0002	0.0061 F /	7.6	<0.015	420	<0.015	<0.15
	MW808	5/15/2008	0.018 F /	<0.02	<0.01	0.18	<0.002	180	<0.01	0.0073	0.0014 F /	0.042 F /	<0.005	78	0.9	<0.0002	0.019	3.6	<0.005	130	<0.005	0.057
		8/19/2008	<0.2	<0.02	<0.01	0.19	<0.002	190	<0.01	0.0062	0.00084 F /	<0.15	<0.005	84	1.1	<0.0002	0.021	4.3	<0.005	140	0.0021 F /	0.0058 F /
		10/21/2008	<0.2	<0.02	<0.01	0.17	<0.002	150	<0.01	0.013	<0.01	0.96	<0.005	65	1.2	<0.0002	0.021	2.6	<0.005	57	0.005	0.044
		10/21/2008 (DUP)	0.021 F /	<0.02	<0.01	0.17	<0.002	150	<0.01	0.014	<0.01	0.95	0.0019 F /	65	1.2	0.0001 F /	0.021	2.6	<0.005	56	0.0056	0.052
		2/4/2009	0.02 F /	<0.020	<0.010	0.27	<0.0020	190	<0.010	0.03	<0.010	2.8	<0.0050	89	2.4	<0.0002	0.054	2.9 / J	<0.0050	120	0.005	<0.020 F / U
		2/4/2009 (DUP)	0.018 F /	<0.020	<0.010	0.25	<0.0020	180	<0.010	0.029	<0.010	2.7	<0.0050	85	2.3	<0.0002	0.052	2.7 / J	<0.0050	120	0.0049 F /	<0.020 F / U
		5/4/2009	<0.20	<0.020	<0.010	0.24	<0.0020	200	<0.010	0.0093	<0.010	0.1	<0.0050	85	1.5	<0.0002	0.014	5.8	<0.0050	200	<0.0050	<0.020
		5/4/2009 (DUP)	<0.20	<0.020	<0.010	0.25	<0.0020	210	<0.010	0.01	<0.010	0.087 F /	<0.0050	89	1.6	<0.0002	0.015	6.3	<0.0050	220	<0.0050	<0.020
		7/29/2009	<0.2	<0.02	<0.01	0.19	<0.002	180	<0.01	0.018	<0.01	1.8	0.0036 F / U	77	1.6	<0.0002	0.019	4.5 / J	<0.005	98	0.0038 F /	<0.02
		10/29/2009	<0.20	<0.020	<0.010	0.2	<0.0020	150	<0.010	0.015	<0.010	4.3	<0.0050	72	1.5	<0.0002	0.025	5.2 / J	<0.0050	84	0.0035 F /	<0.020
		1/15/2010	<0.20	0.0024 F / U	<0.010	0.18	<0.0020	130	<0.010	0.019	<0.010	2.2	<0.0050	65	1.4	<0.0002	0.026	5.4 / J	<0.0050	96	0.0031 F /	<0.020
		4/13/2010	<0.20	<0.020	0.002 F /	0.19	<0.0020	140	<0.010	0.019	<0.010	**7.9**	<0.0050	72	1.3	<0.0002	0.03	5.4	<0.0050	53	0.0031 F /	<0.020
		7/20/2010	<0.20	<0.020	0.0042 F /	0.19	<0.0020	130	<0.010	0.018	<0.010	**7.8**	0.0017 F /	74	1.1	<0.0002	0.031	5.8	0.0013 F /	96	0.0032 F /	0.015 F / U
		7/20/2010 (DUP)	<0.20	<0.020	0.0038 F /	0.19	<0.0020	130	<0.010	0.018	<0.010	**7.9**	0.0018 F /	74	1.1	<0.0002	0.03	5.8	<0.0050	97	0.0035 F /	0.012 F / U
		10/29/2010	0.029 F /	0.0035 F /	<0.010	0.16	0.00081 F / U	120	<0.010	0.0082	<0.010	1.1	<0.0050	60	1.3	<0.0002	0.018	5.2	<0.0050	85	<0.0050	<0.020
		1/27/2011	<0.20	<0.020	<0.010	0.17	<0.0020	130	<0.010	0.0058	<0.010	0.31	<0.0050	68 / J	2	<0.0002	0.023	6.2	<0.0050	75 / J	0.002 F /	<0.020
		1/27/2011 (DUP)	<0.20	<0.020	<0.010	0.17	<0.0020	130	<0.010	0.0061	<0.010	0.4	<0.0050	68 / J	2	<0.0002	0.023	6.3	<0.0050	75 / J	0.0025 F /	<0.020
		4/18/2011	<0.20	0.0041 F /	<0.010	0.2	0.0012 F / U	180	<0.010	0.037	<0.010	4.5	<0.0050	100	1.9	<0.0002	0.036	6.2	<0.0050	74	<0.0050	0.015 F /
		4/18/2011 (DUP)	<0.20	0.0038 F /	<0.010	0.2	0.0012 F / U	180	<0.010	0.038	<0.010	4.7	<0.0050	100	1.9	<0.0002	0.036	6.2	<0.0050	77	<0.0050	0.015 F /
		7/28/2011	<0.20	<0.020	<0.010	0.17	0.001 F / U	150	<0.010	0.0067	<0.010	0.23	<0.0050	61	1.2	<0.0002	0.013	5.2	<0.0050	120	<0.0050	<0.020
		7/28/2011 (DUP)	<0.20	<0.020	<0.010	0.18	0.0011 F / U	160	<0.010	0.0072	0.0019 F /	0.23	<0.0050	66	1.3	<0.0002	0.013	5.6	0.00099 F /	120	<0.0050	<0.020
		10/12/2011	<0.20	<0.020	<0.010	0.17	0.00094 F /	140	<0.010	0.015	0.0018 F /	5	<0.0050	67	1.2	<0.0002	0.021	6.4	<0.0050	88	<0.0050	<0.020
		2/29/2012	<0.20	0.0033 F / U	<0.010	0.16	<0.0020	120	<0.010	0.0082	<0.010	1.7	<0.0050	67	0.55	<0.20	0.022	11 / J	<0.0050	61	0.004 F /	0.0066 F /
		4/16/2012	<0.20	<0.020	<0.010	0.14	0.00081 F /	100	<0.010	0.016	0.0011 F /	2.6	<0.0050	59 / J	0.89	<0.20 U / UJ	0.026	8.3	<0.0050	56 / J	<0.0050	0.0069 F /
		7/18/2012	<0.2	<0.02	<0.01	0.23	0.00099 F /	140	<0.01	0.022	0.0019 F /	4.2	<0.005	77	1.1	U / R	0.028	15	<0.005	85	<0.005	<0.02
		7/18/2012 (DUP)	<0.2	<0.02	<0.01	0.23	0.0011 F /	140	<0.01	0.021	0.0017 F /	3.9	<0.005	77	1.1	U / R	0.028	16	<0.005	85	<0.005	<0.02
		10/25/2012	<0.2	0.0034 F / U	<0.01	0.22	<0.002	150	0.0010 F / U	0.021	<0.01	3	<0.005	86	1.4	<0.2	0.029	12	<0.005	80	0.0052	<0.02
		1/30/2013	<0.3	<0.02	<0.025	0.23	0.0007 F /	170	<0.015	0.0079 F /	0.0048 F /	1.9	<0.015	88	0.85	<0.0002	0.023 F /	13	<0.015	66	0.0029 F /	0.0095 F /
		4/9/2013	<0.3	<0.02	<0.025	0.072	0.00098 F /	220	<0.015	0.01 F /	0.002 F /	0.097 F /	<0.015	100	1.6	<0.0002	0.033 F /	14	<0.015	67	0.0077 F /	0.0045 F /
		7/31/2013	<0.3	<0.02	<0.025	0.073	0.00069 F /	160 / J	<0.015	0.0021 F /	0.0016 F /	<0.1	<0.015	71 / J	0.72	<0.2	0.011 F /	8	<0.005	97 / J	0.0013 F /	<0.15
		10/15/2013	0.78	<0.02	<0.025	0.098	0.0011 F /	200	0.0014 F /	0.01 F /	0.0021 F /	1.3	<0.015	90	3	<0.2	0.032 F /	9.7	<0.005	99	0.0027 F /	0.0093 F /
		10/20/2014	<0.3	<0.02	0.0049 F / B	0.059	0.00066 F /	200	<0.015	<0.015	0.0038 F /	<0.1	<0.015	75	1.5	<0.0002	0.04	17	<0.015	120	0.0014 F /	<0.15
		11/18/2014	<0.3	<0.02	<0.025	0.058	0.00051 F /	170	<0.015	0.0017 F /	<0.015	<0.1	<0.015	62	1.6	<0.0002	0.023 F /	17	<0.015	120	0.0011 F /	<0.15
		12/15/2014	<0.3	<0.02	<0.025	0.061	<0.005	180	<0.015	0.0016 F /	0.0014 F /	<0.1	<0.015	65	1.7	<0.0002	0.023 F /	19	<0.015	110	<0.015	<0.15

TABLE B2

Summary of Analytical Results - Metals
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Site	Well	Analyte	Aluminum		Antimony		Arsenic		Barium		Cadmium		Calcium		Chromium		Cobalt		Copper	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit[(1)]	100		0.024		0.2		NS		0.05		NS		1.0		NS		NS	
		Surface Water RG	NS		0.61		0.16		5		0.0023		NS		0.44		NS		0.026	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M13	*Downgradient*																			
	MW809	5/15/2008	<0.2		<0.02		<0.01		0.029		<0.002		39		<0.01		<0.005		<0.01	
	MW809	8/19/2008	<0.2		<0.02		<0.01		0.028		<0.002		41		<0.01		<0.005		0.0015	F /
	MW809	10/21/2008	0.019	F /	<0.02		<0.01		0.032		<0.002		40		<0.01		<0.005		<0.01	
	MW809	2/5/2009	<0.20		<0.020		<0.010		0.028		<0.0020		41		<0.010		0.0014	F /	<0.010	
	MW809	5/5/2009	<0.20		<0.020		<0.010		0.037		<0.0020		44		<0.010		<0.0050		<0.010	
	MW809	7/29/2009	<0.2		<0.02		<0.01		0.032		<0.002		45		<0.01		0.00082	F /	<0.01	
	MW809	10/29/2009	<0.20		<0.020		<0.010		0.032		<0.0020		43		<0.010		0.0022	F /	<0.010	
	MW809	10/29/2009 (DUP)	<0.20		<0.020		<0.010		0.031		<0.0020		42		<0.010		<0.0050		<0.010	
	MW809	1/15/2010	<0.20		0.0026	F / U	<0.010		0.029		<0.0020		44		<0.010		0.0044	F /	<0.010	
	MW809	4/13/2010	<0.20		<0.020		<0.010		0.033		<0.0020		43		<0.010		<0.0050		<0.010	
	MW809	7/20/2010	<0.20		<0.020		<0.010		0.033		<0.0020		45		<0.010		<0.0050		0.0017	F /
	MW809	10/29/2010	<0.20		<0.020		<0.010		0.029		0.00069	F / U	42		<0.010		<0.0050		<0.010	
	MW809	10/29/2010 (DUP)	<0.20		<0.020		<0.010		0.028		0.00052	F / U	41		<0.010		<0.0050		<0.010	
	MW809	1/27/2011	<0.20		<0.020		<0.010		0.026		<0.0020		41		<0.010		<0.0050		<0.010	
	MW809	4/19/2011	<0.20		<0.020		<0.010		0.026		0.00091	F / U	45		<0.010		<0.0050		<0.010	
	MW809	7/28/2011	<0.20		<0.020		<0.010		0.029		0.00062	F / U	42		<0.010		<0.0050		<0.010	
	MW809	10/12/2011	<0.20		0.0033	F /	<0.010		0.029		0.00076	F /	41		<0.010		<0.0050		<0.010	
	MW809	10/12/2011 (DUP)	<0.20		<0.020		<0.010		0.028		0.00081	F /	40		<0.010		<0.0050		0.0015	F /
	MW809	2/29/2012	<0.20		0.0028	F / U	<0.010		0.031		<0.0020		41		<0.010		<0.0050		<0.010	
	MW809	2/29/2012 (DUP)	<0.20		0.0031	F / U	<0.010		0.031		<0.0020		40		<0.010		<0.0050		<0.010	
	MW809	4/16/2012	0.028	F /	<0.020		<0.010		0.028		0.00065	F /	38		<0.010		<0.0050		<0.010	
	MW809	7/18/2012	<0.2		<0.02		<0.01		0.029		0.00075	F /	43		<0.01		<0.005		0.0014	F /
	MW809	10/25/2012	<0.2		<0.02		<0.01		0.029		<0.002		43		<0.01		<0.005		<0.01	
	MW809	10/25/2012 (DUP)	<0.2		0.0027	F / U	<0.01		0.029		<0.002		43		0.0019	F / U	<0.005		<0.01	
	MW809	1/30/2013	<0.3		<0.02		<0.025		0.028		<0.005		42		<0.015		<0.015		<0.015	
	MW809	4/9/2013	<0.3		<0.02		<0.025		0.024		<0.005		41		<0.015		<0.015		<0.015	
	MW809	7/31/2013	<0.3		<0.02		<0.025		0.028		<0.002		40		<0.015		<0.015		<0.015	
	MW809	7/31/2013 (DUP)	<0.3		<0.02		<0.025		0.028		<0.002		39		<0.015		<0.015		<0.015	
	MW809	10/15/2013	<0.3		<0.02		<0.025		0.029		0.00047	F /	42		<0.015		<0.015		<0.015	
	MW809	10/20/2014	<0.3		<0.02		<0.025		0.034		<0.005		45		0.0008	F /	<0.015		0.0018	F /
	MW809	11/18/2014	<0.3		<0.02		<0.025		0.03		<0.005		41		<0.015		<0.015		<0.015	
	MW809	12/15/2014	<0.3		<0.02		<0.025		0.028		<0.005		44		<0.015		<0.015		<0.015	
	MW811	10/29/2014	0.44	/ J	0.0033	F /	<0.025		0.077		0.00086	F /	150	/ J	0.0023	F /	0.0018	F /	0.0058	F /
	MW811	11/19/2014	0.065	F /	0.0034	F /	<0.025		0.071		<0.005		190		<0.015		0.0017	F /	0.0031	F /
	MW811	12/16/2014	0.29	F /	<0.02		0.0082	F / B	0.074		<0.005		200		0.002	F /	<0.015		0.0039	F /

Site	Well	Analyte	Iron		Lead		Magnesium		Manganese		Mercury		Nickel		Potassium		Silver		Sodium		Vanadium		Zinc	
		Units	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
		Project Action Limit[(1)]	5.0		0.1		NS		10		NS		NS		NS		0.511		NS		NS		10	
		Surface Water RG	1.0		0.064		NS		1.0		0.103		1.0		NS		0.005		NS		NS		1.0	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M13	*Downgradient*																							
	MW809	5/15/2008	<0.15		<0.005		31		0.0056	F /	<0.0002		0.0027	F /	3.7		<0.005		18		<0.005		0.041	
	MW809	8/19/2008	<0.15		<0.005		33		0.003	F /	<0.0002		<0.01		4.2		<0.005		20		0.0013	F /	0.0074	F /
	MW809	10/21/2008	<0.15		0.0022	F /	32		0.027		<0.002		<0.01		3.6		<0.005		20		0.0035	F /	0.024	
	MW809	2/5/2009	0.24		<0.0050		32		0.025		<0.0002		<0.010		3.7	/ J	<0.0050		20		0.0024	F /	<0.020	F / U
	MW809	5/5/2009	<0.10		<0.0050		34		0.0022	F /	<0.0002		<0.010		3.9		<0.0050		25		<0.0050		<0.020	
	MW809	7/29/2009	<0.1		<0.005		35		0.0023	F /	<0.0002		<0.01		3.5	/ J	<0.005		21		0.0028	F /	<0.02	
	MW809	10/29/2009	<0.10		<0.0050		34		0.023		<0.0002		<0.010		3.2	/ J	<0.0050		21		0.0021	F /	<0.020	
	MW809	10/29/2009 (DUP)	<0.10		<0.0050		33		0.019		<0.0002		<0.010		3.1	/ J	<0.0050		20		0.0019	F /	<0.020	
	MW809	1/15/2010	0.097	F /	<0.0050		33		0.041		<0.0002		0.0024	F /	3.5	/ J	0.0014	F /	20		0.0031	F /	<0.020	
	MW809	4/13/2010	0.067	F /	<0.0050		34		0.0091	F /	<0.0002		<0.010		3.1		<0.0050		20		0.002	F /	<0.020	
	MW809	7/20/2010	0.2	/ U	<0.0050		34		0.034		<0.0002		0.002	F /	2.8		0.0011	F /	21		0.0023	F /	0.013	F / U
	MW809	10/29/2010	<0.20		0.002	F /	31		0.0086	F /	<0.0002		<0.010		3.1		<0.0050		21		<0.0050		<0.020	
	MW809	10/29/2010 (DUP)	0.047	F /	0.002	F /	30		0.0085	F /	<0.0002		<0.010		3		<0.0050		21		<0.0050		0.0045	F /
	MW809	1/27/2011	0.15	F /	<0.0050		31	/ J	0.02		<0.0002		<0.010		3.4		<0.0050		19	/ J	0.0017	F /	<0.020	
	MW809	4/19/2011	0.66		<0.0050		32		0.019		<0.0002		<0.010		3.6		<0.0050		21		<0.0050		0.016	F /
	MW809	7/28/2011	0.045	F /	<0.0050		31		0.0016	F /	<0.0002		<0.010		2.9		<0.0050		21		<0.0050		<0.020	
	MW809	10/12/2011	0.08	F /	<0.0050		30		0.0024	F /	<0.0002		<0.010		2.6		<0.0050		20		<0.0050		<0.020	
	MW809	10/12/2011 (DUP)	<0.20		<0.0050		30		0.0023	F /	<0.0002		<0.010		2.5		<0.0050		20		<0.0050		<0.020	
	MW809	2/29/2012	<0.20		<0.0050		31		0.0055	F /	<0.20		<0.010		2.6	/ J	<0.0050		19		0.0022	F /	<0.020	
	MW809	2/29/2012 (DUP)	<0.20		0.0016	F / U	31		0.0059	F /	<0.20		<0.010		2.6	/ J	<0.0050		19		0.0024	F /	<0.020	
	MW809	4/16/2012	0.094	F /	<0.0050		29	/ J	0.0024	F /	<0.20	U / UJ	0.0044	F /	2.4		<0.0050		19	/ J	<0.0050		0.0073	F /
	MW809	7/18/2012	<0.2		<0.005		32		0.0018	F /		U / R	<0.01		2.6		<0.005		20		<0.005		<0.02	
	MW809	10/25/2012	<0.2		<0.005		33		0.0038	F /	<0.2		<0.01		2.8		<0.005		19		0.0029	F /	<0.02	
	MW809	10/25/2012 (DUP)	<0.2		<0.005		33		0.0038	F /	<0.2		<0.01		2.8		<0.005		19		0.0029	F /	<0.02	
	MW809	1/30/2013	0.042	F /	<0.015		32		0.012		<0.0002		0.0013	F /	3.2		<0.015		21		<0.015		<0.15	
	MW809	4/9/2013	0.11		<0.015		30		0.014		<0.0002		<0.04		3.3		<0.015		23		<0.015		<0.15	
	MW809	7/31/2013	<0.1		<0.015		32		0.0012	F /	<0.2		<0.04		2.8	F /	<0.005		22		<0.015		<0.15	
	MW809	7/31/2013 (DUP)	<0.1		<0.015		31		0.0011	F /	<0.2		<0.04		2.7	F /	<0.005		21		<0.015		<0.15	
	MW809	10/15/2013	0.031	F /	<0.015		32		0.003	F /	<0.2		<0.04		2.8	F /	<0.005		23		<0.015		<0.15	
	MW809	10/20/2014	<0.1		<0.015		34		0.0011	F /	<0.0002		0.0017	F /	3.2		<0.015		23		0.0011	F /	<0.15	
	MW809	11/18/2014	0.035	F /	<0.015		31		0.005	F /	<0.0002		0.0015	F /	2.8	F /	<0.015		22		<0.015		0.005	F / B
	MW809	12/15/2014	<0.1		<0.015		31		0.012		<0.0002		<0.04		2.7	F /	<0.015		22		<0.015		<0.15	
	MW811	10/29/2014	1		<0.015		86		0.11		<0.0002		0.01	F /	12		<0.015		260	/ J	0.0031	F / B	0.011	F /
	MW811	11/19/2014	0.17		<0.015		99		0.076		<0.0002		0.0056	F /	9.7		0.0014	F / B	370		<0.015		0.0094	F /
	MW811	12/16/2014	0.59		<0.015		110		0.088		<0.0002		0.0055	F /	8.8		<0.015		410		0.0021	F /	0.011	F /

Footnotes:

(1) Project Action Limits (Remedial Goal {RG}) obtained from Worksheet #15 of Appendix B (QAPP) of the *Long Term Monitoring Plan* (Toltest, 2010). IEPA Class II groundwater standards for industrial uses are presented where Class I and Class II standards (potable and industrial uses, respectively) were both available.

General Notes:

Site M11 not sampled during Second Quarter.
An abbreviated list of analytes is used for reporting based on historically detected and reported compounds.
Data since the sampling round conducted immediately prior to the completion of each individual site RA are shown.
mg/L = microgram per liter
Bolded result indicates Project Action Limit (RG) exceedance
NS = No standard
< = Result shows laboratory Method Reporting Limit for non-detected results
LF/VF = Lab Flag/Validation Flag
F = Concentration below the reported detection limit
J = Estimated concentration
U = Not detected
UJ = Estimated detection limit
B = Blank contamination
DUP = duplicate

B3 - SUMMARY OF HISTORICAL GROUNDWATER RESULTS – INDICATOR PARAMETERS

TABLE B3

Summary of Analytical Results - Indicator Parameters
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	Nitrate		Sulfate	
		Units	mg/L		mg/L	
		Project Action Limit[(1)]	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M1		***In-Plume***				
	MW107	4/30/2008	NA		**21,000**	
		10/8/2008	NA		**12,000**	
		5/2/2009	NA		**49,000**	
		10/29/2009	NA		**34,000**	
		4/12/2010	NA		**30,000**	
		10/31/2010	NA		**26,000**	
		4/20/2011	NA		**26,000**	
		10/15/2011	NA		**23,000**	
		4/12/2012	NA		**26,000**	
		10/25/2012	NA		**22,000**	
		4/11/2013	NA		**17,000**	
		10/22/2013	NA		**20,000**	
		10/29/2014	NA		**16,000**	
		12/8/2014	NA		**16,000**	
	MW231	4/30/2008	NA		**32,000**	
		10/8/2008	8.1		**35,000**	
		5/2/2009	NA		**41,000**	
		10/29/2009	NA		**38,000**	
		4/9/2010	NA		**41,000**	
		10/31/2010	NA		**32,000**	
		4/20/2011	NA		**34,000**	
		10/15/2011	NA		**32,000**	
		10/15/2011 (DUP)	NA		**33,000**	
		4/12/2012	NA		**35,000**	
		10/25/2012	NA		**36,000**	
		4/12/2013	NA		**32,000**	
		10/22/2013	NA		**33,000**	
		10/28/2014	NA		**35,000**	
		10/28/2014 (DUP)	NA		**30,000**	
		12/8/2014	NA		**34,000**	
	MW640	4/30/2008	NA		**4,100**	
		10/8/2008	NA		**2,400**	
		10/8/2008 (DUP)	NA		**2,700**	
		5/2/2009	NA		**5,000**	
		10/29/2009	NA		**5,000**	
		4/12/2010	NA		**5,200**	
		10/31/2010	NA		**5,000**	
		4/19/2011	NA		**5,400**	
		10/15/2011	NA		**5,100**	
		4/12/2012	NA		**5,200**	
		10/25/2012	NA		**4,300**	
		4/15/2013	NA		**6,800**	
		10/22/2013	NA		**5,800**	
		10/28/2014	NA		**6,300**	
		12/8/2014	NA		**5,500**	
	MW641	4/30/2008	NA		**940**	
		4/30/2008 (DUP)	NA		**930**	
		10/8/2008	NA		**1,000**	
		5/2/2009	NA		**820**	
		10/29/2009	NA		**910**	
		4/12/2010	NA		**920**	
		10/31/2010	NA		**1,300**	
		4/20/2011	NA		**670**	
		10/17/2011	NA		**1,100**	
		4/12/2012	NA		**640**	
		4/12/2012	NA		**640**	
		10/25/2012	NA		**1,100**	
		4/12/2013	NA		**480**	
		4/12/2013 (DUP)	NA		**480**	
		10/22/2013	NA		**1000**	
		10/29/2014	NA		**690**	
		12/8/2014	NA		**650**	

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		Compound	**Nitrate**		**Sulfate**	
		Units	mg/L		mg/L	
		Project Action Limit[1]	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M1	***In-Plume***					
	MW642	5/7/2008	NA		380	
		10/9/2008	NA		**430**	
		5/2/2009	NA		**440**	
		10/29/2009	NA		**430**	
		4/12/2010	NA		**430**	
		4/12/2010 (DUP)	NA		**450**	
		10/31/2010	NA		**460**	
		4/20/2011	NA		**430**	
		4/20/2011 (DUP)	NA		**500**	
		10/17/2011	NA		**410**	
		4/12/2012	NA		**420**	
		4/12/2012 (DUP)	NA		**420**	
		10/25/2012	NA		390	
		10/25/2012 (DUP)	NA		400	
		4/15/2013	NA		**410**	
		10/22/2013	NA		390	
		10/29/2014	NA		**420**	
		12/8/2014	NA		390	
	Early Warning					
	MW643	4/29/2008	NA		130	
		10/8/2008	NA		93	
		5/2/2009	NA		110	
		10/28/2009	NA		53	
		10/28/2009 (DUP)	NA		52	
		4/12/2010	NA		59	
		11/1/2010	NA		25	
		4/18/2011	NA		54	
		10/15/2011	NA		38	
		4/13/2012	NA		58	
		10/26/2012	NA		160	
		4/11/2013	NA		160	
		10/21/2013	NA		73	
		10/28/2014	NA		75	
		12/8/2014	NA		85	
		12/8/2014 (DUP)	NA		84	
	MW644	4/29/2008	NA		240	
		4/29/2008 (DUP)	NA		240	
		10/8/2008	NA		95	
		5/2/2009	NA		240	
		10/28/2009	NA		120	/ U
		4/12/2010	NA		140	
		11/1/2010	NA		170	
		4/18/2011	NA		170	
		10/15/2011	NA		180	
		4/13/2012	NA		160	
		10/26/2012	NA		86	
		4/11/2013	NA		150	
		10/21/2013	NA		160	
		10/28/2014	NA		180	
		12/8/2014	NA		160	

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		Compound	**Nitrate**		**Sulfate**	
		Units	mg/L		mg/L	
		Project Action Limit(1)	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M1	***Compliance***					
	MW645	4/29/2008	NA		94	
		10/8/2008	NA		100	
		5/2/2009	NA		65	
		10/28/2009	NA		65	
		4/12/2010	NA		57	
		11/1/2010	NA		70	
		4/18/2011	NA		90	
		10/15/2011	NA		88	
		4/13/2012	NA		67	
		10/25/2012	NA		90	
		4/11/2013	NA		100	
		10/21/2013	NA		110	
		10/27/2014	NA		110	
		12/8/2014	NA		**550**	
	MW646	4/29/2008	NA		140	
		10/8/2008	NA		100	
		5/2/2009	NA		130	
		10/28/2009	NA		100	/ J
		4/12/2010	NA		190	
		11/1/2010	NA		150	
		4/19/2011	NA		120	
		10/15/2011	NA		120	
		4/13/2012	NA		110	
		10/25/2012	NA		110	
		4/11/2013	NA		110	
		10/21/2013	NA		110	
		10/27/2014	NA		120	
		12/8/2014	NA		**570**	
	MW648	4/30/2008	NA		120	
		10/8/2008	NA		28	
		10/28/2009	NA		10	
		4/12/2010	NA		10	
		11/1/2010	NA		10	
		4/18/2011	NA		37	
		10/15/2011	NA		7.5	
		4/12/2012	NA		34	
		10/25/2012	NA		14	
		4/11/2013	NA		13	
		10/22/2013	NA		14	
		10/28/2014	NA		32	
		12/8/2014	NA		32	
	MW649	4/29/2008	NA		100	
		10/8/2008	NA		120	
		10/8/2008 (DUP)	NA		120	
		10/29/2009	NA		100	
		4/12/2010	NA		57	
		11/1/2010	NA		240	
		4/20/2011	NA		86	
		10/17/2011	NA		68	
		4/13/2012	NA		64	
		10/25/2012	NA		120	
		4/11/2013	NA		190	
		10/22/2013	NA		170	
		10/28/2014	NA		150	
		12/8/2014	NA		**1500**	

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		Compound	**Nitrate**		**Sulfate**	
		Units	mg/L		mg/L	
		Project Action Limit[(1)]	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M1	***Compliance***					
	SW709	5/2/2009	NA		33	
		10/26/2009	NA		39	
		4/12/2010	NA		43	
		11/1/2010	NA		86	
		4/18/2011	NA		54	
		10/15/2011	NA		47	
		4/13/2012	NA		60	
		10/26/2012	NA		180	
		4/11/2013	NA		59	
		10/22/2013	NA		34	/ J
		10/28/2014	NA		68	
		12/8/2014	NA		76	
MFG (M8)	***In-Plume***					
	MW330	10/21/2003		J / R	**500**	/ J
		5/21/2004	NA		**570**	
		10/21/2004	NA		**440**	
		10/19/2005	NA		340	
		5/4/2006	NA		**510**	
		10/12/2006	NA		**560**	
		4/30/2007	NA		**570**	
		4/30/2007 (DUP)	NA		370	
		10/16/2007	NA		**540**	
		5/19/2008	NA		**570**	
		5/6/2009	NA		**530**	/ J
		10/23/2009	NA		**410**	/ J
		4/9/2010	NA		**410**	
		11/3/2010	NA		**460**	
		4/20/2011	NA		**420**	
		10/18/2011	NA		**440**	
		4/17/2012	NA		**430**	
		10/23/2012	NA		**440**	
		4/10/2013	NA		**530**	
		10/17/2013	NA		**590**	
		10/17/2013 (DUP)	NA		**600**	
		10/20/2014	NA		**570**	
		12/16/2014	NA		**580**	
M11	***Upgradient***					
	MW802	5/15/2008	<0.1		320	
		10/7/2008	0.034	F /	91	
		10/7/2008 (DUP)	0.055	F /	93	
		5/4/2009	<0.10	U / UJ	45	/ J
		10/27/2009	0.13		82	
		4/13/2010	<0.10		51	
		10/28/2010	0.063	F / J	79	
		4/15/2011	0.42		130	
		10/11/2011	0.18	/ UJ	140	
		4/16/2012	0.11		85	
		10/24/2012	0.13	F /	260	
		10/16/2013	0.11	F /	88	
		12/11/2014	0.092	F / B	200	
	MW803	10/7/2008	0.77		110	
		5/4/2009	0.82	/ J	91	/ J
		10/27/2009	0.28		87	
		4/13/2010	0.82		91	
		10/28/2010	0.95	/ J	91	
		4/15/2011	1.2		89	
		10/11/2011	1.1	/ J	92	
		10/24/2012	0.99		98	
		10/16/2013	0.95		91	
		12/15/2014	0.81		90	

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		Compound	**Nitrate**		**Sulfate**	
		Units	mg/L		mg/L	
		Project Action Limit(1)	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M11	***Downgradient***					
	MW333	5/12/2008	0.19		66	
		10/6/2008	0.042	F /	68	
		5/5/2009	NA		58	/ J
		10/28/2009	<0.10		46	
		4/13/2010	0.22		59	
		10/28/2010	<0.10		56	
		4/18/2011	0.22		60	
		10/11/2011	0.19	/ UJ	59	
		10/24/2012	0.14	F /	59	
		10/16/2013	0.26	F /	80	
		12/15/2014	0.19	F /	75	
	MW334	5/12/2008	0.09	F /	**530**	
		10/6/2008	0.036	F /	**520**	
		5/5/2009	0.2	/ J	**420**	
		10/28/2009	<0.10		330	/ J
		4/13/2010	<0.10		340	
		10/28/2010	0.066	F / J	340	
		4/18/2011	0.094	F /	300	
		10/11/2011	0.23	/ UJ	250	
		10/11/2011 (DUP)	0.25	/ UJ	260	
		10/24/2012	<0.2		240	
		10/16/2013	<0.5		220	
		12/15/2014	0.22	F /	190	
	MW335	5/13/2008	0.11		**1,300**	
		10/7/2008	0.12		**1,300**	
		10/7/2008 (DUP)	<0.1		**460**	
		5/4/2009	0.21	/ J	**1,100**	
		10/28/2009	<0.10		190	/ J
		4/13/2010	0.36		**890**	
		4/13/2010 (DUP)	0.34		**910**	
		10/28/2010	0.079	F / J	**780**	
		4/15/2011	0.47		**710**	
		10/12/2011	0.28	/ UJ	**750**	
		4/16/2012	0.31		**660**	
		10/24/2012	<0.2		**580**	
		10/16/2013	<0.5		**690**	
		10/16/2013 (DUP)	0.045	F /	**700**	
		12/11/2014	<0.5		**480**	
		12/11/2014 (DUP)	<0.5		**490**	
	MW336	5/13/2008	0.026	F /	400	
		10/7/2008	0.031	F /	**510**	
		5/5/2009	<0.10		**490**	
		5/5/2009 (DUP)	<0.10	/ U	**500**	
		10/27/2009	<0.10		**450**	/ J
		10/27/2009 (DUP)	0.1		**2,100**	/ J
		4/13/2010	0.089	F /	**430**	
		10/28/2010	0.088	F / J	**480**	
		4/18/2011	0.14		400	
		10/12/2011	0.14	/ UJ	**410**	
		4/16/2012	0.12		**410**	
		10/24/2012	0.37		**510**	
		10/24/2012 (DUP)	0.37		**530**	
		10/16/2013	<0.5		**710**	
		12/11/2014	0.1	F / B	340	

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		Compound	Nitrate		Sulfate	
		Units	mg/L		mg/L	
		Project Action Limit[(1)]	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M11			***Downgradient***			
	MW804	5/15/2008	<0.1		78	
		10/6/2008	0.088	F /	**520**	
		5/5/2009	<0.10	U / UJ	190	
		10/27/2009	0.11		210	
		4/13/2010	<0.10		140	
		10/28/2010	0.068	F / J	**470**	
		4/15/2011	0.087	F /	190	
		4/15/2011 (DUP)	0.091	F /	190	
		10/11/2011	0.21	/ UJ	320	
		10/24/2012	0.17	F /	**490**	
		10/16/2013	<0.5		**410**	
		12/11/2014	0.092	F / B	240	
	MW805	10/6/2008	1.5		**590**	
		5/5/2009	1.1	/ J	**490**	
		10/27/2009	1.4		**510**	/ J
		4/13/2010	0.29		**490**	
		11/2/2010	<0.10		**540**	
		4/15/2011	0.18		**500**	
		10/11/2011	0.21	/ UJ	**470**	
		4/16/2012	0.22		**470**	
		10/24/2012	0.21		**450**	
		10/16/2013	<0.5		**470**	
		12/11/2014	<0.5		**450**	
M13			***Upgradient***			
	MW806	5/15/2008	0.18		86	
		8/19/2008	<0.1		59	
		10/21/2008	0.093	F /	85	
		2/4/2009	0.49	/ J	75	
		5/5/2009	<0.10	/ U	70	
		7/29/2009	0.18		74	
		10/28/2009	0.12	/ J	63	/ J
		1/15/2010	0.34		69	
		4/14/2010	0.57		77	
		7/21/2010	0.092	F /	69	
		10/28/2010	0.055	F / J	80	
		1/27/2011	0.37		70	/ J
		4/19/2011	0.34		76	
		7/28/2011	0.16	/ J	79	
		10/12/2011	<0.10	U / UJ	66	
		2/29/2012	0.39		79	
		4/16/2012	0.39	/ J	80	
		7/17/2012	0,19	/ J	76	
		10/24/2012	0.13	F /	71	
		1/31/2013	0.26	F /	78	
		1/31/2013 (DUP)	0.42	F /	79	
		4/9/2013	0.23	F /	80	
		7/31/2013	0.06	F / B	79	
		10/15/2013	0.068	F /	69	
		10/21/2014	0.16	F /	68	
		11/19/2014	0.15	F /	71	
		12/16/2014	0.17	F /	70	

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		Compound	Nitrate		Sulfate	
		Units	mg/L		mg/L	
		Project Action Limit[(1)]	10		400	
		Surface Water RG	NS		NS	
Site	Well	Date	Result	LF/VF	Result	LF/VF
M13	*Upgradient*					
	MW807	5/15/2008	<0.1		190	
		5/15/2008 (DUP)	0.029	F /	190	
		8/19/2008	1.1		54	
		8/19/2008 (DUP)	<0.1		55	
		10/21/2008	0.17		240	
		2/4/2009	<0.10	U / UJ	210	
		5/5/2009	<1.0	U / UJ	200	
		7/29/2009	<0.1		220	
		10/28/2009	<2.0		190	/ J
		1/15/2010	<2.0		210	
		4/14/2010	<2.0		200	
		7/21/2010	<2.0		220	
		10/28/2010	0.22	/ J	230	
		1/27/2011	<1.0		220	/ J
		4/19/2011	<1.0		230	
		7/28/2011	<1.0	/ J	230	
		10/12/2011	<1.0	U / UJ	230	
		2/29/2012	<1.0		230	
		4/16/2012	<1.0	U / UJ	230	
		7/17/2012		U / R	230	
		10/24/2012	<2		230	
		1/31/2013	<1		260	
		4/9/2013	<1		230	
		7/31/2013	<1		230	
		10/15/2013	<1		240	
		10/21/2014	<0.5		250	
		11/19/2014	<1		240	
		12/16/2014	0.063	F /	230	
	Downgradient					
	MW126R	5/20/2008	0.047	F /	63	
		8/20/2008	<0.1		<5	
		10/22/2008	0.064	F /	62	
		2/5/2009	<0.10	/ UJ	53	
		5/5/2009	0.15	/ J	53	/ J
		7/28/2009	0.12		53	
		10/29/2009	0.95	/ J	79	/ J
		1/14/2010	<2.0		57	
		4/14/2010	0.83		83	
		4/14/2010 (DUP)	0.87		84	
		7/20/2010	0.39		51	
		10/28/2010	0.98	/ J	60	
		1/28/2011	0.18		61	
		4/19/2011	0.19		57	
		7/28/2011	0.13	/ J	53	
		10/13/2011	0.57		49	
		2/29/2012	0.12		53	
		4/16/2012	0.13		52	
		7/17/2012	0.11	/ J	53	
		10/25/2012	0.16	F /	55	
		1/30/2013	0.072	F /	60	
		4/9/2013	0.089	F /	56	
		7/31/2013	0.07	F / B	47	
		10/15/2013	0.087	F /	50	
		10/21/2014	<0.5		55	
		11/19/2014	0.061	F /	57	
		12/16/2014	<0.5		68	

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		Compound	Nitrate		Sulfate	
		Units	mg/L		mg/L	
		Project Action Limit(1)	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13		***Downgradient***				
	MW362	5/13/2008	0.079	F /	260	
		8/20/2008	<0.1		<5	
		10/22/2008	0.032	F /	310	
		2/5/2009	<0.10		240	
		5/5/2009	<1.0	U / UJ	240	
		7/28/2009	<0.10		260	
		10/29/2009	<2.0		360	
		1/14/2010	<2.0		230	
		1/14/2010 (DUP)	<2.0		220	
		4/14/2010	<2.0		210	
		7/20/2010	<2.0		220	/ J
		10/28/2010	0.21	/ J	250	
		1/28/2011	<2.0		240	
		4/19/2011	<1.0		250	
		7/28/2011		U / R	260	
		10/13/2011	<1.0		260	
		2/29/2012	<1.0		280	
		4/16/2012	<1.0		270	
		4/16/2012	<1.0	U / UJ	270	
		7/17/2012	<1.0	/ J	270	
		10/25/2012	<2		250	
		1/30/2013	0.077	F /	280	
		4/9/2013	<0.5		260	
		4/9/2013 (DUP)	<0.5		260	
		7/31/2013	0.12	F / B	240	
		10/15/2013	<1		260	
		10/15/2013 (DUP)	<1		260	
		10/21/2014	<0.5		270	
		10/21/2014 (DUP)	0.048	F /	260	
		11/19/2014	<0.5		260	
		11/19/2014 (DUP)	<0.5		260	
		12/16/2014	<0.5		260	
		12/16/2014 (DUP)	<0.5		250	

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		Compound	**Nitrate**		**Sulfate**	
		Units	mg/L		mg/L	
		Project Action Limit(1)	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13	***Downgradient***					
	MW808	5/15/2008	0.4		140	
		8/19/2008	<0.1		130	
		10/21/2008	0.14		100	
		10/21/2008 (DUP)	0.18		99	
		2/4/2009	<0.10	U / UJ	150	
		2/4/2009 (DUP)	<0.10		150	
		5/4/2009	0.33	/ J	190	
		5/4/2009 (DUP)	2	/ J	180	
		7/29/2009	<0.1		380	
		10/29/2009	<0.10		140	/ J
		1/15/2010	<0.10		94	
		4/13/2010	<0.10		64	
		7/20/2010	<0.10		63	
		7/20/2010 (DUP)	<0.10		65	
		10/29/2010	0.15		92	
		1/27/2011	<0.10		81	/ J
		1/27/2011 (DUP)	0.58	F / U	87	/ J
		4/18/2011	<0.10		230	
		4/18/2011 (DUP)	<0.10		220	
		7/28/2011	0.98		120	
		7/28/2011 (DUP)	0.84	/ J	120	
		10/12/2011	<1.0	U / UJ	160	
		2/29/2012	<0.10		99	
		4/16/2012	<0.10		88	
		7/18/2012	<0.1		160	
		7/18/2012	<0.1		160	
		10/25/2012	<2		140	
		1/30/2013	<0.5		130	
		4/9/2013	3.8		**490**	
		7/31/2013	1.5		200	
		10/15/2013	<0.5		260	
		10/20/2014	0.29	F / J	210	
		11/18/2014	<0.5		190	
		12/15/2014	0.15	F /	270	

TABLE B3

Summary of Analytical Results - Indicator Parameters
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	Nitrate		Sulfate	
		Units	mg/L		mg/L	
		Project Action Limit(1)	10		400	
		Surface Water RG	NS		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13			***Downgradient***			
	MW809	5/15/2008	<0.1		6.1	
		8/19/2008	0.21		9.5	
		10/21/2008	0.16		12	
		2/5/2009	<0.10	U / UJ	9.9	
		5/5/2009	0.27	/ J	9.2	/ J
		7/29/2009	0.23		11	
		10/29/2009	0.09	F / J	8.9	/ J
		10/29/2009 (DUP)	0.13	/ J	8.9	/ J
		1/15/2010	<0.10		9.5	
		4/13/2010	0.12		8	
		7/20/2010	0.11		9.9	
		10/29/2010	0.053	F /	10	
		10/29/2010 (DUP)	0.053	F /	12	/ U
		1/27/2011	<0.10		9.4	/ J
		4/19/2011	0.067	F /	7.3	
		7/28/2011	0.14	/ U	7.7	
		10/12/2011	0.13	/ J	6.3	
		10/12/2011 (DUP)	0.12	/ J	6.5	
		2/29/2012	<0.10		5.9	
		2/29/2012	<0.10		5.9	
		4/16/2012	0.13	/ J	5.4	
		7/18/2012	0.15		7.5	
		10/25/2012	0.14	F /	8.3	
		10/25/2012	0.11	F /	8.1	
		1/30/2013	<0.5		8.1	
		4/9/2013	0.091	F /	8.5	
		7/31/2013	0.087	F /	7.7	
		7/31/2013 (DUP)	0.076	F /	7.6	
		10/15/2013	0.068	F /	8.3	
		10/20/2014	0.078	F / J	14	/ J
		11/18/2014	0.042	F /	8.5	
		12/15/2014	<0.5		8.9	
	MW811	10/29/2014	<5		260	
		11/19/2014	0.62		220	
		12/16/2014	<0.5		220	

Footnotes:
(1) Project Action Limits (Remedial Goal {RG}) obtained from Worksheet #15 of Appendix B (QAPP) of the *Long Term Monitoring Plan* (Toltest 2010). IEPA Class II groundwater standards for industrial uses are presented where Class I and Class II standards (potable and industrial uses, respectively) were both available.

General Notes:
Site M11 not sampled in spring
Data since the sampling round conducted immediately prior to the completion of each individual site RA are shown.
mg/L = milligrams per liter
NS = No standard
NA = not analyzed
Bolded result indicates Project Action Limit (RG) exceedance
< = Result shows laboratory Method Reporting Limit for non-detected results
LF/VF = Lab Flag/Validation Flag
R = Rejected data, unusable
F = Concentration below the reported detection limit
J = Estimated concentration
U = Not detected
UJ = Estimated detection limit
DUP = duplicate

B4 - SUMMARY OF HISTORICAL GROUNDWATER RESULTS – VOLATILE ORGANIC COMPOUNDS

TABLE B4

Summary of Analytical Results - Volatile Organic Compounds
2013 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**Acetone**		**Benzene**		**Carbon disulfide**		**Chlorobenzene**		**Chloromethane**		**1,1-DCA**		**1,2-DCA**		**cis-1,2-DCE**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	NS		25		NS		500		NS		3500		25		200	
		Surface Water RG	120,000		420		NS		79		NS		2,000		4,500		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M11	***Upgradient***																	
	MW802	5/15/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		10/7/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		10/7/2008 (DUP)	<10		<1		<5		<1		<1		<1		<1		NA	
		5/4/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		10/28/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		4/13/2010	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0	
		4/15/2011	<5		<1		<5		<1		<1		<1		<1		<1	
		10/11/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	<5		<1		<5		<1		<1		<1		<1		<1	
		10/16/2013	<10		<1		<2		<1		<2		<1		<1	U / UJ	<1	
		12/11/2014	<10		<1		<2		<1		<2		<1		<1		<1	
	MW803	10/7/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		5/4/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		10/27/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/13/2010	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0	
		4/15/2011	<5	U / UJ	<1		<5		<1		<1		<1		<1		<1	
		10/11/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	<5		<1		<5		<1		<1		<1		<1		<1	
		10/16/2013	<10		<1		<2		<1		<2		<1		<1	U / UJ	<1	
		12/15/2014	6.4	F /	<1		<2		<1		<2		<1		<1		<1	
	Downgradient																	
	MW333	5/12/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		10/6/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		5/5/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		10/28/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/13/2010	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0	
		4/18/2011	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/11/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	<5		<1		<5		<1		<1		<1		<1		<1	
		10/16/2013	<10		<1		<2		<1		<2		<1		<1	U / UJ	<1	
		12/15/2014	<10		<1		<2		<1		<2		<1		<1		<1	
	MW334	5/12/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		10/6/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		5/5/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		10/28/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/13/2010	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0	
		4/18/2011	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/11/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/11/2011 (DUP)	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	<5		<1		<5		<1		<1		<1		<1		<1	
		10/16/2013	<10		<1		<2		<1		<2		<1		<1	U / UJ	<1	
		12/15/2014	<10		<1		<2		<1		<2		<1		<1		<1	
	MW335	5/13/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		10/7/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		10/7/2008 (DUP)	<10		<1		<5		<1		<1		<1		<1		NA	
		5/4/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		10/28/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/13/2010	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/13/2010 (DUP)	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0	
		4/15/2011	<5	U / UJ	<1		<5		<1		<1		<1		<1		<1	
		10/12/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		4/16/2012	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	<5		<1		<5		<1		<1		<1		<1		<1	
		10/16/2013	<10		<1		<2		<1		<2		<1		<1	U / UJ	<1	
		10/16/2013 (DUP)	<10		<1		<2		<1		<2		<1		<1	U / UJ	<1	
		12/11/2014	<10		<1		<2		<1		<2		<1		<1		<1	
		12/11/2014 (DUP)	<10		<1		<2		<1		<2		<1		<1		<1	

		Compound	**1,2-DCE(tot)**		**Ethyl Benzene**		**MethCl**		**MEK**		**Naphthalene**		**PCE**		**Toluene**		**1,1,1-TCA**		**TCE**		**VC**		**Xylenes (total)**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	25		1,000		NS		NS		NS		25		2,500		1,000		25		25		10,000	
		Surface Water RG	1,100		17		NS		NS		NS		150		650		390		NS		NS		110	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M11	***Upgradient***																							
	MW802	5/15/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/7/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/7/2008 (DUP)	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		5/4/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/13/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/15/2011	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/11/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/16/2013	NA		<1		<5		<6		<1		<1		<1		<1	U / UJ	<1		<1.5		<2	
		12/11/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW803	10/7/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		5/4/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/27/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/13/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/15/2011	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/11/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/16/2013	NA		<1		<5		<6		<1		<1		<1		<1	U / UJ	<1		<1.5		<2	
		12/15/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	Downgradient																							
	MW333	5/12/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/6/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		5/5/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/13/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/18/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/11/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/16/2013	NA		<1		<5		<6		<1		<1		<1		<1	U / UJ	<1		<1.5		<2	
		12/15/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW334	5/12/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/6/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		5/5/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/13/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/18/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/11/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/11/2011 (DUP)	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/16/2013	NA		<1		<5		<6		<1		<1		<1		<1	U / UJ	<1		<1.5		<2	
		12/15/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW335	5/13/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/7/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/7/2008 (DUP)	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		5/4/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/13/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/13/2010 (DUP)	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/15/2011	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/12/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/16/2013	NA		<1		<5		<6		<1		<1		<1		<1	U / UJ	<1		<1.5		<2	
		10/16/2013 (DUP)	NA		<1		<5		<6		<1		<1		<1		<1	U / UJ	<1		<1.5		<2	
		12/11/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		12/11/2014 (DUP)	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	

TABLE B4

Summary of Analytical Results - Volatile Organic Compounds
2013 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	Acetone		Benzene		Carbon disulfide		Chlorobenzene		Chloromethane		1,1-DCA		1,2-DCA		cis-1,2-DCE		1,2-DCE(tot)		Ethyl Benzene		MethCl		MEK		Naphthalene		PCE		Toluene		1,1,1-TCA		TCE		VC		Xylenes (total)	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[1]	NS		25		NS		500		NS		3500		25		200		25		1,000		NS		NS		NS		25		2,500		1,000		25		25		10,000	
		Surface Water RG	120,000		420		NS		79		NS		2,000		4,500		NS		1,100		17		NS		NS		NS		150		650		390		NS		NS		110	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M11			*Downgradient*																																						
	MW336	5/13/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/7/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		5/5/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		5/5/2009 (DUP)	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/27/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/27/2009 (DUP)	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/13/2010	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/18/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		0.94	F /	<1.0		<1.0		<1.0		<1.0		<1.0	
		10/12/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	5.1		<1		<5		<1		<1		<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/24/2012 (DUP)	5.4		<1		<5		<1		<1		<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/16/2013	<10		<1		<2		<1		<2		<1		<1	U / UJ	<1		NA		<1		<5		<6		<1		<1		<1		<1	U / UJ	<1		<1.5		<2	
		12/11/2014	3.5	F /	<1		<2		<1		<2		<1		<1		<1				<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW804	5/15/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/6/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		5/5/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/27/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/13/2010	<5.0	U / UJ	<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/15/2011	<5	U / UJ	<1		<5		<1		<1		<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		4/15/2011 (DUP)	<5	U / UJ	<1		<5		<1		<1		<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/11/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	<5		<1		<5		<1		<1		<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/16/2013	<10		<1		<2		<1		<2		<1		<1	U / UJ	<1		NA		<1		<5		<6		<1		<1		<1		<1	U / UJ	<1		<1.5		<2	
		12/11/2014	<10		<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW805	10/6/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		5/5/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/27/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/13/2010	<5.0	U / UJ	<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		11/2/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/15/2011	<5		<1		<5		<1		<1		<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/11/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/24/2012	5.5		<1		<5		<1		<1		<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/16/2013	<10		<1		<2		<1		<2		<1		<1	U / UJ	<1		NA		<1		<5		<6		<1		<1		<1		<1	U / UJ	<1		<1.5		<2	
		12/11/2014	4.1	F /	<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	

TABLE B4

Summary of Analytical Results - Volatile Organic Compounds
2013 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	Acetone		Benzene		Carbon disulfide		Chlorobenzene		Chloromethane		1,1-DCA		1,2-DCA		cis-1,2-DCE		1,2-DCE(tot)		Ethyl Benzene		MethCl		MEK		Naphthalene		PCE		Toluene		1,1,1-TCA		TCE		VC		Xylenes (total)	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	NS		25		NS		500		NS		3500		25		200		25		1,000		NS		NS		NS		25		2,500		1,000		25		25		10,000	
		Surface Water RG	120,000		420		NS		79		NS		2,000		4,500		NS		1,100		17		NS		NS		NS		150		650		390		NS		NS		110	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M13																					***Upgradient***																				
	MW806	5/15/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		8/19/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/21/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		2/4/2009	<5.0	U / UJ	<1.0	U / UJ	<5.0	U / UJ	<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<2.0	
		5/5/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/29/2009	<5		<1		<5	U / UJ	<1		<1		<1		<1		<1		NA		<1		<3		<5	U / UJ	<1		<1		<1		<1		<1		<1		<2	
		10/28/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/15/2010	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/14/2010	<5.0	U / UJ	<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/21/2010	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/27/2011	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	U / UJ	<2.0	
		4/19/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		2.6	F / U	<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/28/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/12/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		2/29/2012	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/17/2012		U / R	<1		<5		<1			U / R	<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/24/2012	<5		<1		<5		<1		<1		<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		1/31/2013	<10	U / UJ	<1		<2		<1		<2		<1		<1		<1		NA		<1		0.5	F /	<6	U / UJ	<1		<1		<1		<1		<1		<1.5		<1	
		1/31/2013 (DUP)	<10	U / UJ	<1		<2		<1		<2		<1		<1		<1		NA		<1		0.57	F /	<6	U / UJ	<1		<1		<1		<1		<1		<1.5		<1	
		4/9/2013	<10	U / Q	<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<1	
		7/31/2013	<10		<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		10/15/2013	<10		<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		10/21/2014	<10		<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		11/19/2014	<10		<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		12/16/2014	<10		<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW807	5/15/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		5/15/2008 (DUP)	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		8/19/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		8/19/2008 (DUP)	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/21/2008	<10		<1		<5		<1		<1		1.3		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		2/4/2009	<5.0	U / UJ	<1.0	U / UJ	<5.0	U / UJ	<1.0	U / UJ	<1.0		1.2		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<2.0	
		5/5/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	1.5		<1.0		0.79	F /	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/29/2009	<5		<1		<5	U / UJ	<1		<1		1.5		<1		<1		NA		<1		<3		<5	U / UJ	<1		<1		<1		<1		<1		<1		<2	
		10/28/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	1.5		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/15/2010	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		1.5		<1.0		0.76	F /	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/14/2010	<5.0	U / UJ	<1.0		<5.0	U / UJ	<1.0		<1.0		1.6		<1.0		0.66	F /	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/21/2010	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	1.6		<1.0		0.85	F /	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		1.7		<1.0		0.81	F /	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/27/2011	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	U / UJ	<2.0	
		4/19/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	1.6		<1.0		0.94	F /	NA		<1.0		2.6	F / U	<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/28/2011	<5.0		<1.0		<5.0		<1.0		<1.0		1.6		<1.0		0.76	F /	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/12/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	1.7		<1.0		0.95	F /	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		2/29/2012	<5.0		<1.0		2.4	F /	<1.0		<1.0	U / UJ	1.4		<1.0		0.79	F /	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/17/2012		U / R	<1		<5		<1			U / R	1.5		<1		1.1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/24/2012	<5		<1		<5		<1		<1		1.5		<1		1		NA		<1		<3		<5		<1		<1		<1		<1		0.23	F /	<1		<1	
		1/31/2013	<10	U / UJ	<1		<2		<1		<2		1.9		<1		1.2		NA		<1		0.52	F /	<6	U / UJ	<1		<1		<1		0.28	F /	0.28	F /	<1.5		<1	
		4/9/2013	<10	U / Q	<1		<2		<1		<2		1.5		<1		1.1		NA		<1		<5		<6		<1		<1		<1		0.22	F /	0.22	F /	<1.5		<1	
		7/31/2013	<10		<1		<2		<1		<2		1.5		<1		1		NA		<1		<5		<6		<1		<1		<1		<1		0.19	F /	<1.5		<2	
		10/15/2013	<10		<1		<2		<1		<2		1.4		<1	U / UJ	0.88	F /	NA		<1		<5		<6		<1	U / UJ	<1		<1		0.32	F / J	0.22	F /	<1.5		<2	
		10/21/2014	<10		<1		<2		<1		<2		1.5		<1		1.1		NA		<1		<5		<6		<1		<1		<1		<1		0.19	F /	<1.5		<2	
		11/19/2014	<10		<1		<2		<1		<2		1.8		<1		1.3		NA		<1		<5		<6		<1		<1		<1		<1		0.2	F /	<1.5		<2	
		12/16/2014	<10		<1		<2		<1		<2		2		<1		1.4		NA		<1		<5		<6		<1		<1		<1		<1		0.19	F /	<1.5		<2	

TABLE B4

Summary of Analytical Results - Volatile Organic Compounds
2013 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**Acetone**		**Benzene**		**Carbon disulfide**		**Chlorobenzene**		**Chloromethane**		**1,1-DCA**		**1,2-DCA**		**cis-1,2-DCE**		**1,2-DCE(tot)**		**Ethyl Benzene**		**MethCl**		**MEK**		**Naphthalene**		**PCE**		**Toluene**		**1,1,1-TCA**		**TCE**		**VC**		**Xylenes (total)**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[1]	NS		25		NS		500		NS		3500		25		200		25		1,000		NS		NS		NS		25		2,500		1,000		25		25		10,000	
		Surface Water RG	120,000		420		NS		79		NS		2,000		4,500		NS		1,100		17		NS		NS		NS		150		650		390		NS		NS		110	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13		***Downgradient***																																						
	MW126R	5/20/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		8/20/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/22/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		2/5/2009	<5.0	U / UJ	<1.0	U / UJ	<5.0	U / UJ	<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<2.0	
		5/5/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		1.2	/ J	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/28/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/29/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/14/2010	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/14/2010	<5.0	U / UJ	<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/14/2010 (DUP)	<5.0	U / UJ	<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/20/2010	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/28/2011	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	U / UJ	<2.0	
		4/19/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		2.5	F / U	<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/28/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/13/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		2/29/2012	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		0.23	F /	<1.0		<1.0	
		7/17/2012		U / R	<1		<5		<1			U / R	<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/25/2012	<5		<1		<5		<1		<1		<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		1/30/2013	<10		<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<1	
		4/9/2013	<10	U / Q	<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<1	
		7/31/2013	<10		<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		10/15/2013	<10		<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		10/21/2014	4.1	F / B	<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		11/19/2014	<10		<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		12/16/2014	8	F /	<1		<2		<1		<2		<1		<1		<1		NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
	MW362	5/13/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		8/20/2008	5.8	F /	<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/22/2008	<10		<1		<5		<1		<1		<1		<1		NA		<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		2/5/2009	<5.0	U / UJ	<1.0	U / UJ	<5.0	U / UJ	<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<2.0	
		5/5/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		1.7	/ J	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/28/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/29/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/14/2010	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/14/2010 (DUP)	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/14/2010	<5.0	U / UJ	<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/20/2010	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/28/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		0.43	F /	<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/28/2011	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	U / UJ	<2.0	
		4/19/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		2.5	F / U	<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/28/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/13/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		2/29/2012	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012 (DUP)	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/17/2012		U / R	<1		<5		<1			U / R	<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/25/2012	<5		<1		<5		<1		<1		<1		<1		<1		NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		1/30/2013	<10		<1		<2		<1		<2		0.42	F /	<1		<1		NA		<1		<5		<6		<1		0.23	F /	<1		<1		<1		<1.5		<1	
		4/9/2013	<10		<1		<2		<1		<2		0.4	F /	<1		<1		NA		<1		<5		<6		<1		0.26	F /	<1		<1		<1		<1.5		<1	
		4/9/2013 (DUP)	<10		<1		<2		<1		<2		0.39	F /	<1		<1		NA		<1		<5		<6		<1		0.23	F /	<1		<1		<1		<1.5		<1	
		7/31/2013	<10		<1		<2		<1		<2		0.4	F /	<1		<1		NA		<1		<5		<6		<1		0.21	F /	<1		<1		<1		<1.5		<2	
		10/15/2013	<10		<1		<2		<1		<2		0.45	F /	<1		<1		NA		<1		<5		<6		<1		0.27	F /	<1		<1		<1		<1.5		<2	
		10/15/2013 (DUP)	<10		<1		<2		<1		<2		0.46	F /	<1		0.19	F /	NA		<1		<5		<6		<1		0.26	F /	<1		<1		<1		<1.5		<2	
		10/21/2014	3.7	F / B	<1		<2		<1		<2		0.46	F /	<1		<1		NA		<1		<5		<6		<1		0.27	F /	<1		<1		<1		<1.5		<2	
		10/21/2014 (DUP)	6.5	F / B	<1		<2		<1		<2		0.48	F /	<1		0.16	F /	NA		<1		<5		<6		<1		0.28	F /	<1		0.17	F /	<1		<1.5		<2	
		11/19/2014	<10		<1		<2		<1		<2		0.54	F /	<1		0.17	F /	NA		<1		<5		<6		<1		0.3	F /	<1		0.19	F /	<1		<1.5		<2	
		11/19/2014 (DUP)	<10		<1		<2		<1		<2		0.54	F /	<1		0.18	F /	NA		<1		<5		<6		<1		0.32	F /	<1		0.18	F /	<1		<1.5		<2	
		12/16/2014	<10		<1		<2		<1		<2		0.6	F /	<1		0.21	F /	NA		<1		<5		<6		<1		0.29	F /	<1		0.18	F /	<1		<1.5		<2	
		12/16/2014 (DUP)	<10		<1		<2		<1		<2		0.59	F /	<1		0.21	F /	NA		<1		<5		<6		<1		0.29	F /	<1		0.17	F /	<1		<1.5		<2	

TABLE B4

Summary of Analytical Results - Volatile Organic Compounds
2013 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**Acetone**		**Benzene**		**Carbon disulfide**		**Chlorobenzene**		**Chloromethane**		**1,1-DCA**		**1,2-DCA**		**cis-1,2-DCE**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	NS		25		NS		500		NS		3500		25		200	
		Surface Water RG	120,000		420		NS		79		NS		2,000		4,500		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13		***Downgradient***																
	MW808	5/15/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		8/19/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		10/21/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		10/21/2008 (DUP)	<10		<1		<5		<1		<1		<1		<1		NA	
		2/4/2009	<5.0	U / UJ	<1.0	U / UJ	<5.0	U / UJ	<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0	
		2/4/2009 (DUP)	<5.0	U / UJ	<1.0	U / UJ	<5.0	U / UJ	<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0	
		5/4/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		5/4/2009 (DUP)	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		7/29/2009	<5		<1		<5	U / UJ	<1		<1		<1		<1		<1	
		10/29/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		1/15/2010	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/13/2010	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/20/2010	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		7/20/2010 (DUP)	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		10/29/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0	
		1/27/2011	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		1/27/2011 (DUP)	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		4/18/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		4/18/2011 (DUP)	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		7/28/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/28/2011 (DUP)	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/12/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		2/29/2012	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		4/16/2012	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/18/2012		U / R	<1		<5		<1			U / R	<1		<1		<1	
		7/18/2012 (DUP)		U / R	<1		<5		<1			U / R	<1		<1		<1	
		10/25/2012	22		<1		<5		<1		<1		<1		<1		<1	
		1/30/2013	7.3	F /	<1		<2		<1		<2		<1		<1		<1	
		4/9/2013	<10	U / Q	<1		<2		<1		<2		<1		<1		<1	
		7/31/2013	<10		<1		<2		<1		<2		<1		<1		<1	
		10/15/2013	<10		<1		<2		<1		<2		<1		<1		<1	
		10/20/2014	3.6	F / B	<1		<2		<1		<2		<1		<1		<1	
		11/18/2014	<10		<1		<2		<1		<2		<1		<1		<1	
		12/15/2014	<10		<1		<2		<1		<2		<1		<1		<1	

		Compound	**1,2-DCE(tot)**		**Ethyl Benzene**		**MethCl**		**MEK**		**Naphthalene**		**PCE**		**Toluene**		**1,1,1-TCA**		**TCE**		**VC**		**Xylenes (total)**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	25		1,000		NS		NS		NS		25		2,500		1,000		25		25		10,000	
		Surface Water RG	1,100		17		NS		NS		NS		150		650		390		NS		NS		110	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13		***Downgradient***																						
	MW808	5/15/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		8/19/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/21/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		10/21/2008 (DUP)	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
		2/4/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<2.0	
		2/4/2009 (DUP)	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<2.0	
		5/4/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		5/4/2009 (DUP)	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/29/2009	NA		<1		<3		<5	U / UJ	<1		<1		<1		<1		<1		<1		<2	
		10/29/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/15/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		4/13/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/20/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		7/20/2010 (DUP)	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		10/29/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
		1/27/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	U / UJ	<2.0	
		1/27/2011 (DUP)	NA		<1.0		2.8	F /	<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	U / UJ	<2.0	
		4/18/2011	NA		<1.0		2.5	F / U	<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/18/2011 (DUP)	NA		<1.0		2.7	F / U	<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/28/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/28/2011 (DUP)	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/12/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		2/29/2012	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/16/2012	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/18/2012	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		7/18/2012 (DUP)	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		10/25/2012	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
		1/30/2013	NA		<1		0.34	F /	<6		<1	U / UJ	<1		<1		<1		<1		<1.5		<1	
		4/9/2013	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<1	
		7/31/2013	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		10/15/2013	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		10/20/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		11/18/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
		12/15/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	

TABLE B4

Summary of Analytical Results - Volatile Organic Compounds
2013 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	Acetone		Benzene		Carbon disulfide		Chlorobenzene		Chloromethane		1,1-DCA		1,2-DCA		cis-1,2-DCE	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[1]	NS		25		NS		500		NS		3500		25		200	
		Surface Water RG	120,000		420		NS		79		NS		2,000		4,500		NS	
Site	Well	Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
M13		*Downgradient*																
	MW809	5/15/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		8/19/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		10/21/2008	<10		<1		<5		<1		<1		<1		<1		NA	
		2/5/2009	<5.0	U / UJ	<1.0	U / UJ	<5.0	U / UJ	<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0	
		5/5/2009	<5.0		<1.0		<5.0	U / UJ	<1.0		1.1	/ J	<1.0		<1.0		<1.0	
		7/29/2009	<5		<1		<5	U / UJ	<1		<1		<1		<1		<1	
		10/29/2009	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		10/29/2009 (DUP)	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		1/15/2010	<5.0	U / UJ	<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		4/13/2010	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/20/2010	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		10/29/2010	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0	
		10/29/2010 (DUP)	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0	
		1/27/2011	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		4/19/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		7/28/2011	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		10/12/2011	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		10/12/2011 (DUP)	<5.0		<1.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		2/29/2012	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		2/29/2012 (DUP)	<5.0		<1.0		<5.0		<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0	
		4/16/2012	<5.0		<1.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0	
		7/18/2012		U / R	<1		<5		<1			U / R	<1		<1		<1	
		10/25/2012	<5		<1		<5		<1		<1		<1		<1		<1	
		10/25/2012 (DUP)	<5		<1		<5		<1		<1		<1		<1		<1	
		1/30/2013	2.5	F /	<1		<2		<1		<2		<1		<1		<1	
		4/9/2013	<10	U / Q	<1		<2		<1		<2		<1		<1		<1	
		7/31/2013	<10		<1		<2		<1		<2		<1		<1		<1	
		7/31/2013 (DUP)	<10		<1		<2		<1		<2		<1		<1		<1	
		10/15/2013	<10		<1		<2		<1		<2		<1		<1		<1	
		10/20/2014	3.7	F / B	<1		<2		<1		<2		<1		<1		<1	
		11/18/2014	<10		<1		<2		<1		<2		<1		<1		<1	
		12/15/2014	<10		<1		<2		<1		<2		<1		<1		<1	
	MW811	10/29/2014	<10		<1		<2		<1	U / UJ	<2		<1		<1		<1	
		11/19/2014	<10		0.25	F /	<2		<1		<2		0.17	F /	<1		<1	
		12/16/2014	<10		0.43	F /	<2		<1		<2		0.23	F /	<1		<1	

Compound	1,2-DCE(tot)		Ethyl Benzene		MethCl		MEK		Naphthalene		PCE		Toluene		1,1,1-TCA		TCE		VC		Xylenes (total)	
Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
Project Action Limit[1]	25		1,000		NS		NS		NS		25		2,500		1,000		25		25		10,000	
Surface Water RG	1,100		17		NS		NS		NS		150		650		390		NS		NS		110	
Date	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF	Result	LF/VF
5/15/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
8/19/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
10/21/2008	<2		<1		<1		<10		NA		<1		<1		<1		<1		<1		<2	
2/5/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<2.0	
5/5/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
7/29/2009	NA		<1		<3		<5	U / UJ	<1		<1		<1		<1		<1		<1		<2	
10/29/2009	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
10/29/2009 (DUP)	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
1/15/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
4/13/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
7/20/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
10/29/2010	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
10/29/2010 (DUP)	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<2.0	
1/27/2011	NA		<1.0		2.4	F /	<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	U / UJ	<2.0	
4/19/2011	NA		<1.0		2.6	F / U	<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
7/28/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
10/12/2011	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
10/12/2011 (DUP)	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
2/29/2012	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
2/29/2012 (DUP)	NA		<1.0		<3.0		<5.0	U / UJ	<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
4/16/2012	NA		<1.0		<3.0		<5.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0		<1.0	
7/18/2012	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
10/25/2012	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
10/25/2012 (DUP)	NA		<1		<3		<5		<1		<1		<1		<1		<1		<1		<1	
1/30/2013	NA		<1		<5		<6		<1	U / UJ	<1		<1		<1		<1		<1.5		<1	
4/9/2013	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<1	
7/31/2013	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
7/31/2013 (DUP)	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
10/15/2013	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
10/20/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
11/18/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
12/15/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
10/29/2014	NA		<1		<5		<6		<1	U / UJ	<1		0.22	F / J	<1		<1		<1.5		<2	
11/19/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	
12/16/2014	NA		<1		<5		<6		<1		<1		<1		<1		<1		<1.5		<2	

Footnotes:
(1) Project Action Limits (Remedial Goal {RG}) obtained from Worksheet #15 of Appendix B (QAPP) of the *Long Term Monitoring Plan* (Toltest, 2010). IEPA Class II groundwater standards for industrial uses are presented where Class I and Class II standards (potable and industrial uses, respectively) were both available.

General Notes:
Site M11 not sampled in spring
Data since the sampling round conducted immediately prior to the completion of each individual site RA are shown.
An abbreviated list of compounds analyzed is used for reporting based on historically detected and reported compounds.
µg/L = Micrograms Per Liter
Bolded result indicates Project Action Limit (RG) exceedance
DUP = Duplicate
NS = No Standard
NA = not analyzed
< = Result shows laboratory method reporting limit for non-detected results
LF/VF = Lab Flag/Validation Flag
Q = Laboratory Control Sample recovery lower than quality control limits
J = Estimated concentration
U = Not detected
UJ = Not detected, estimated detection limit
R = Rejected data, unusable
B = Blank contamination
F = Concentration below the reported detection limit

1,1,1-TCA = 1,1,1-Trichloroethane
1,1-DCA = 1,1-Dichloroethane
1,2-DCA = 1,2-Dichloroethane
cis-1,2-DCE = cis-1,2-Dichloroethene
MEK = Methyl Ethyl Ketone (2-butanone)
MethCl = Methylene Chloride
PCE = Tetrachloroethene
TCE = Trichloroethene
VC = Vinyl chloride

B5 - SUMMARY OF HISTORICAL GROUNDWATER RESULTS – SEMI-VOLATILE ORGANIC COMPOUNDS

TABLE B5

Summary of Analytical Results - Semivolatile Organic Compounds
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	2,4-DNT		2,6-DNT		Naphthalene		NB		2-Methylnaphthalene		Phenol	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[1]	0.42		0.42		NS		51		NS		NS	
		Surface Water RG	330		150		68		8000		12		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M11							*Upgrdient*							
	MW802	5/15/2008	<0.95		<0.48		<0.95		<1.4		<0.48		<4.8	
		10/7/2008	<0.95		<0.48		<0.95		<1.4		<0.48		<4.8	
		10/7/2008 (DUP)	<0.96		<0.48		<0.96		<1.4		<0.48		<4.8	
		5/4/2009	<1.3		<0.48		<0.95		<0.95		<0.48		<4.8	
		10/27/2009	<1.3		<0.47		<0.93		<0.93	U / UJ	<0.47		<4.7	U / UJ
		4/13/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
		10/28/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		4/15/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/11/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		4/16/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
		10/24/2012	<1.4		<0.51		<1		<1		<0.51		<5.1	
		10/16/2013	<20		<20		<9.9		<20		<9.9		<9.9	
		12/11/2014	<19		<19		<9.7		<19		<9.7		<9.7	
	MW803	10/7/2008	<0.93		<0.47		<0.93		<1.4		<0.47		<4.7	
		5/4/2009	<1.3		<0.47		<0.94		<0.94		<0.47		<4.7	
		10/27/2009	<1.3		<0.47		<0.94		<0.94	U / UJ	<0.47		<4.7	U / UJ
		4/13/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
		10/28/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		4/15/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/11/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/24/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/16/2013	<19		<19		<9.5		<19		<9.5		<9.5	
		12/15/2014	<19		<19		<9.5		<19		<9.5		<9.5	
							Downgradient							
	MW333	5/12/2008	<0.98		<0.49		<0.98		<1.5		<0.49		<4.9	
		10/6/2008	<0.98		<0.49		<0.98		<1.4		<0.47		<4.7	
		5/5/2009	<1.3		<0.47		<0.94		<0.94		<0.47		<4.7	
		10/28/2009	<1.3		<0.47		<0.93		<0.93	U / UJ	<0.47		<4.7	U / UJ
		4/13/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
		10/28/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		4/18/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/11/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/24/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/16/2013	<19		<19		<9.5		<19		<9.5		<9.5	
		12/15/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW334	5/12/2008	<0.98		<0.49		<0.98		<1.5		<0.49		<4.9	
		10/6/2008	<0.97		<0.49		<0.97		<1.5		<0.49		<4.9	
		5/5/2009	<1.3		<0.48		<0.95		<0.95		<0.48		<4.8	
		10/28/2009	<1.3		<0.47		<0.93		<0.93	U / UJ	<0.47		<4.7	U / UJ
		4/13/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
		10/28/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		4/18/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/11/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/11/2010 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/24/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/16/2013	<19		<19		<9.4		<19		<9.4		<9.4	
		12/15/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW335	5/13/2008	<0.96		<0.48		<0.96		<1.4		<0.48		<4.8	
		10/7/2008	<0.99		<0.5		<0.99		<1.5		<0.5		<5	
		10/7/2008 (DUP)	<0.94		<0.47		<0.94		<1.4		<0.47		<4.7	
		5/4/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/28/2009	<1.3		<0.47		<0.94		<0.94	U / UJ	<0.47		<4.7	U / UJ
		4/13/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
		4/13/2010 (DUP)	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
		10/28/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		4/15/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/12/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		4/16/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
		10/24/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/16/2013	<19		<19		<9.5		<19		<9.5		<9.5	
		10/16/2013 (DUP)	<19		<19		<9.5		<19		<9.5		<9.5	
		12/11/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		12/11/2014 (DUP)	<19		<19		<9.5		<19		<9.5		<9.5	
	MW336	5/13/2008	<0.96		<0.48		<0.96		<1.4		<0.48		<4.8	
		10/7/2008	<0.93		<0.47		<0.93		<1.4		<0.47		<4.7	
		5/5/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		5/5/2009 (DUP)	<1.3		<0.47		<0.94		<0.94		<0.47		<4.7	
		10/27/2009	<1.3		<0.47		<0.93		<0.93	U / UJ	<0.47		<4.7	U / UJ
		10/27/2009 (DUP)	<1.3		<0.47		<0.93		<0.93	U / UJ	<0.47		<4.7	U / UJ
		4/13/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
		10/28/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		4/18/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/12/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		4/16/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/24/2012	<1.3	U / J	<0.47	U / J	<0.93	U / J	<0.93	U / J	<0.47	U / J	<4.7	U / J
		10/24/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/16/2013	<19		<19		<9.5		<19		<9.5		<9.5	
		12/11/2014	<19		<19		<9.6		<19		<9.6		<9.6	

TABLE B5

Summary of Analytical Results - Semivolatile Organic Compounds
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Joliet Army Ammunition Plant
Will County, Illinois

		Compound	**2,4-DNT**		**2,6-DNT**		**Naphthalene**		**NB**		**2-Methylnaphthalene**		**Phenol**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit(1)	0.42		0.42		NS		51		NS		NS	
		Surface Water RG	330		150		68		8000		12		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M11							***Downgradient***							
	MW804	5/15/2008	<0.96		<0.48		<0.96		<1.4		<0.48		<4.8	
	MW804	10/6/2008	<0.94		<0.47		<0.94		<1.4		<0.47		<4.7	
	MW804	5/5/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW804	10/27/2009	<1.3		<0.48		<0.95		<0.95	U / UJ	<0.48		<4.8	U / UJ
	MW804	4/13/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
	MW804	10/28/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW804	4/15/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW804	4/15/2011 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW804	10/11/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW804	10/24/2012	<4		<1.4		<2.9		<2.9		<1.4		<14	
	MW804	10/16/2013	<19		<19		<9.6		<19		<9.6		<9.6	
	MW804	12/11/2014	<22		<22		<11		<22		<11		<11	
	MW805	10/6/2008	<1		<0.51		<1		<1.5		<0.51		<5.1	
	MW805	5/5/2009	<1.3		<0.47		<0.94		<0.94		<0.47		<4.7	
	MW805	10/27/2009	<1.3		<0.47		<0.93		<0.93	U / UJ	<0.47		<4.7	U / UJ
	MW805	4/13/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
	MW805	11/2/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW805	4/15/2011	<1.3		<0.47		<0.93		<0.93	U / UJ	<0.47		<4.7	
	MW805	10/11/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW805	4/16/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
	MW805	10/24/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW805	10/16/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW805	12/11/2014	<19		<19		<9.5		<19		<9.5		<9.5	
M13							***Upgradient***							
	MW806	5/15/2008	<0.95		<0.48		<0.95		<1.4		<0.48		<4.8	
	MW806	8/19/2008	<0.94		<0.47		<0.94		<1.4		<0.47		<4.7	
	MW806	10/21/2008	<1		<0.5		<1		<1.5		<0.5		<5	
	MW806	2/4/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW806	5/5/2009	<1.3		<0.47		<0.93		<0.93		<0.47		8.2	
	MW806	7/29/2009	<1.3	U / UJ	<0.47		<0.93		<0.93		<0.47		<4.7	
	MW806	10/28/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW806	1/15/2010	<1.3		0.23	F /	<0.94		<0.94		<0.47		<4.7	
	MW806	4/14/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
	MW806	7/21/2010	<1.3		<0.47		0.64	F /	<0.93		<0.47		<4.7	
	MW806	10/28/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW806	1/27/2011	<1.4		<0.50		<1.0		<1.0		<0.50	U / UJ	<5.0	
	MW806	4/19/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW806	7/28/2011	<1.4		<0.51		<1.0		<1.0		<0.51		<5.1	
	MW806	10/12/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW806	2/29/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
	MW806	4/16/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
	MW806	7/17/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW806	10/24/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW806	1/31/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW806	1/31/2013 (DUP)	<19		<19		<9.5		<19		<9.5		<9.5	
	MW806	4/9/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW806	7/31/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW806	10/15/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW806	10/21/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW806	11/19/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW806	12/16/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW807	5/15/2008	<0.99		<0.5		<0.99		<1.5		<0.5		<5	
	MW807	5/15/2008 (DUP)	<0.95		<0.48		<0.95		<1.4		<0.48		<4.8	
	MW807	8/19/2008	<0.94		<0.47		<0.94		<1.4		<0.47		<4.7	
	MW807	8/19/2008 (DUP)	<0.94		<0.47		<0.94		<1.4		<0.47		<4.7	
	MW807	10/21/2008	<0.93		<0.47		<0.93		<1.4		<0.47		<4.7	
	MW807	2/4/2009	<1.3		<0.47		0.49	F /	<0.93		1.4		<4.7	
	MW807	5/5/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW807	7/29/2009	<1.3	U / UJ	<0.47		<0.93		<0.93		<0.47		<4.7	
	MW807	10/28/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW807	1/15/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW807	4/14/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
	MW807	7/21/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW807	10/28/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW807	1/27/2011	<1.4		<0.50		<1.0		<1.0		<0.50	U / UJ	<5.0	
	MW807	4/19/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW807	7/28/2011	<1.4	U / UJ	<0.49	U / UJ	<0.98	U / UJ	<0.98	U / UJ	<0.49	U / UJ	<4.9	
	MW807	10/12/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW807	2/29/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
	MW807	4/16/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
	MW807	7/17/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW807	10/24/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW807	1/31/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW807	4/9/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW807	7/31/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW807	10/15/2013	<19		<19		<9.4		<19		<9.4		<9.4	
	MW807	10/21/2014	<23		<23		<12		<23		<12		<12	
	MW807	11/19/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW807	12/16/2014	<19		<19		<9.6		<19		<9.6		<9.6	

TABLE B5

Summary of Analytical Results - Semivolatile Organic Compounds
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		Compound	**2,4-DNT**		**2,6-DNT**		**Naphthalene**		**NB**		**2-Methylnaphthalene**		**Phenol**	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit(1)	0.42		0.42		NS		51		NS		NS	
		Surface Water RG	330		150		68		8000		12		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13							***Downgradient***							
	MW126R	5/20/2008	<0.93		<0.47		<0.93		<1.4		<0.47		<4.7	
		8/20/2008	<0.94		<0.47		<0.94		<1.4		<0.47		<4.7	
		10/22/2008	<0.99		<0.5		<0.99		<1.5		<0.5		<5	
		2/5/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		5/5/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		7/28/2009	<1.3	U / UJ	<0.47		<0.93		<0.93		<0.47		<4.7	
		10/29/2009	<1.3		<0.47		<0.94		<0.94		<0.47		<4.7	
		1/14/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		4/14/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
		4/14/2010 (DUP)	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
		7/20/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/28/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		1/28/2011	<1.4		<0.52		<1.0		<1.0		<0.52		<5.2	
		4/19/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		7/28/2011	<1.4		<0.50		<0.99		<0.99		<0.50		<5.0	
		10/13/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		2/29/2012	<1.3		<0.48		<0.95		<0.95		<0.48	U / UJ	<4.8	
		4/16/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
		7/17/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		10/25/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		1/30/2013	<19		<19		<9.6		<19		<9.6		<9.6	
		4/9/2013	<19		<19		<9.5		<19		<9.5		<9.5	
		7/31/2013	<19		<19		<9.4		<19		<9.4		<9.4	
		10/15/2013	<19		<19		<9.5		<19		<9.5		<9.5	
		10/21/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		11/19/2014	<19		<19		<9.5		<19		<9.5		<9.5	
		12/16/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW362	5/13/2008	<0.98		<0.49		<0.98		<1.5		<0.49		<4.9	
		8/20/2008	<0.95		<0.48		<0.95		<1.4		<0.48		<4.8	
		10/22/2008	<0.97		<0.49		<0.97		<1.5		<0.49		<4.9	
		2/5/2009	**2.2**		0.2	F /	<0.93		<0.93		<0.47		<4.7	
		5/5/2009	<1.3		0.19	F /	<0.93		<0.93		<0.47		<4.7	
		7/28/2009	**1.3**	F / J	<0.47		<0.93		<0.93		<0.47		<4.7	
		10/29/2009	**2.3**		<0.47		<0.93		<0.93		<0.47		<4.7	
		1/14/2010	**3.8**		0.32	F /	<0.93		<0.93		<0.47		<4.7	
		1/14/2010 (DUP)	**3.6**		0.35	F /	<0.93		<0.93		<0.47		<4.7	
		4/14/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
		7/20/2010	**2.2**		**0.55**		<0.93		<0.93		<0.47		<4.7	
		10/28/2010	**5.7**		<0.47		<0.93		<0.93		<0.47		<4.7	
		1/28/2011	**7.1**		<0.52		0.17	F /	<1.0		<0.52		<5.2	
		4/19/2011	**1.7**		<0.47		<0.93		<0.93		<0.47		<4.7	
		7/28/2011	**0.95**	F /	0.2	F /	<1.1		<1.1		<0.54		<5.4	
		10/13/2011	**1.9**		<0.47		<0.93		<0.93		<0.47		<4.7	
		2/29/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
		4/16/2012	**3.3**		0.25	F /	<0.93		<0.93		<0.47	U / UJ	<4.7	
		4/16/2012	**2.6**		0.29	F /	<0.93		<0.93		<0.47	U / UJ	<4.7	
		7/17/2012	**2.8**		0.29	F /	<0.93		<0.93		<0.47		<4.7	
		10/25/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
		1/30/2013	**4.3**	F /	<19		<9.5		<19		<9.5		<9.5	
		4/9/2013	**1.8**	F /	<19		<9.5		<19		<9.5		<9.5	
		4/9/2013 (DUP)	**1.7**	F /	<19		<9.5		<19		<9.5		<9.5	
		7/31/2013	<19		<19		<9.5		<19		<9.5		<9.5	
		10/15/2013	**5.4**	F /	<19		<9.5		<19		<9.5		<9.5	
		10/15/2013 (DUP)	**5.7**	F /	<19		<9.5		<19		<9.5		<9.5	
		10/21/2014	**3.4**	F /	<19		<9.5		<19		<9.5		<9.5	
		10/21/2014 (DUP)	**2.9**	F /	<19		<9.7		<19		<9.7		<9.7	
		11/19/2014	**4.4**	F /	<19		<9.5		<19		<9.5		<9.5	
		11/19/2014 (DUP)	**4.8**	F /	<19		<9.5		<19		<9.5		<9.5	
		12/16/2014	**4.8**	F /	<20		<10		<20		<10		<10	
		12/16/2014 (DUP)	**4.7**	F /	<19		<9.6		<19		<9.6		<9.6	

TABLE B5

Summary of Analytical Results - Semivolatile Organic Compounds
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	2,4-DNT		2,6-DNT		Naphthalene		NB		2-Methylnaphthalene		Phenol	
		Units	μg/L		μg/L		μg/L		μg/L		μg/L		μg/L	
		Project Action Limit[(1)]	0.42		0.42		NS		51		NS		NS	
		Surface Water RG	330		150		68		8000		12		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13							***Downgradient***							
	MW808	5/15/2008	<0.95		<0.48		<0.95		<1.4		<0.48		<4.8	
	MW808	8/19/2008	<0.98		<0.49		<0.98		<1.5		<0.49		<4.9	
	MW808	10/21/2008	<0.98		<0.49		<0.98		<1.5		<0.49		<4.9	
	MW808	10/21/2008 (DUP)	<0.99		<0.5		<0.99		<1.5		<0.5		<5	
	MW808	2/4/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	2/4/2009 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	5/4/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	5/4/2009 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	7/29/2009	<1.3	U / UJ	<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	10/29/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	1/15/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	4/13/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
	MW808	7/20/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	7/20/2010 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	10/29/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	1/27/2011	<1.5		<0.54		<1.1		<1.1		<0.54	U / UJ	<5.4	
	MW808	1/27/2011 (DUP)	<1.4		<0.51		<1.0		<1.0		<0.51	U / UJ	<5.1	
	MW808	4/18/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	4/18/2011 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	7/28/2011		U / R		U / R		U / R		U / R		U / R		U / R
	MW808	7/28/2011 (DUP)		U / R		U / R		U / R		U / R		U / R		U / R
	MW808	10/12/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	2/29/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
	MW808	4/16/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
	MW808	7/18/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	7/18/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	10/25/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW808	1/30/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW808	4/9/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW808	7/31/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW808	10/15/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW808	10/20/2014	<19		<19		<9.6		<19		<9.6		<9.6	
	MW808	11/18/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW808	12/15/2014	<19		<19		<9.7		<19		<9.7		<9.7	
	MW809	5/15/2008	<0.95		<0.48		<0.95		<1.4		<0.48		<4.8	
	MW809	8/19/2008	<0.94		<0.47		<0.94		<1.4		<0.47		<4.7	
	MW809	10/21/2008	<0.98		<0.49		<0.98		<1.5		<0.49		<4.9	
	MW809	2/5/2009	<1.3		<0.47		<0.93		<0.93		0.16	F /	<4.7	
	MW809	5/5/2009	<1.3		<0.47		<0.93		<0.93	U / UJ	<0.47		<4.7	
	MW809	7/29/2009	<1.3	U / UJ	<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	10/29/2009	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	10/29/2009 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	1/15/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	4/13/2010	<1.3	U / UJ	<0.47	U / UJ	<0.93		<0.93		<0.47		<4.7	
	MW809	7/20/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	10/29/2010	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	10/29/2010 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	1/27/2011	<1.4		<0.51		<1.0		<1.0		<0.51	U / UJ	<5.1	
	MW809	4/19/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	7/28/2011	<1.3	U / UJ	<0.47	U / UJ	<0.93	U / UJ	<0.93	U / UJ	<0.47	U / UJ	<4.7	
	MW809	10/12/2011	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	10/12/2011 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	2/29/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
	MW809	2/29/2012 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
	MW809	4/16/2012	<1.3		<0.47		<0.93		<0.93		<0.47	U / UJ	<4.7	
	MW809	7/18/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	10/25/2012	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	10/25/2012 (DUP)	<1.3		<0.47		<0.93		<0.93		<0.47		<4.7	
	MW809	1/30/2013	<19		<19		<9.4		<19		<9.4		<9.4	
	MW809	4/9/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW809	7/31/2013	<19		<19		<9.4		<19		<9.4		<9.4	
	MW809	7/31/2013 (DUP)	<19		<19		<9.5		<19		<9.5		<9.5	
	MW809	10/15/2013	<19		<19		<9.5		<19		<9.5		<9.5	
	MW809	10/20/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW809	11/18/2014	<19		<19		<9.5		<19		<9.5		<9.5	
	MW809	12/15/2014	<19		<19		<9.5		<19		<9.5		<9.5	

TABLE B5

Summary of Analytical Results - Semivolatile Organic Compounds
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

		Compound	2,4-DNT		2,6-DNT		Naphthalene		NB		2-Methylnaphthalene		Phenol	
		Units	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
		Project Action Limit[(1)]	0.42		0.42		NS		51		NS		NS	
		Surface Water RG	330		150		68		8000		12		NS	
Site	**Well**	**Date**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**	**Result**	**LF/VF**
M13	*Downgradient*													
	MW811	10/29/2014	<19		<19		<9.6		<19		<9.6		<9.6	
		11/19/2014	<21		<21		<11		<21		<11		<11	
		12/16/2014	<19		<19		<9.5		<19		<9.5		<9.5	

Footnotes:

(1) Project Action Limits (Remedial Goal {RG}) obtained from Worksheet #15 of Appendix B (QAPP) of the *Long Term Monitoring Plan* (Toltest, 2010). IEPA Class II groundwater standards for industrial uses are presented where Class I and Class II standards (potable and industrial uses, respectively) were both available.

General Notes:

Site M11 not sampled in spring
An abbreviated list of compounds analyzed is used for reporting based on historically detected and reported compounds.
Data since the sampling round conducted immediately prior to the completion of each individual site RA are shown.
µg/L = microgram per liter
NS = No standard
Bolded result indicates Project Action Limit (RG) exceedance
< = Result shows laboratory Method Reporting Limit for non-detected results
LF/VF = Lab Flag/Validation Flag
R = Rejected data, unusable
F = Concentration below the reported detection limit
J = Estimated concentration
U = Not detected
UJ = Estimated detection limit
DUP = duplicate

2,4-DNT = 2,4-Dinitrotoluene
2,6-DNT = 2,6-Dinitrotoluene
NB = Nitrobenzene

APPENDIX C

DATA REPORTS

C1 – Data Evaluation Reports
C2 – Data Usability Report

C1 - DATA EVALUATION REPORTS

Data Quality Evaluation of Analytical Data for Environmental Remediation Services

Contract No. W9124J-14-P-0142
Site-Wide Long-Term Groundwater Monitoring at Joliet Army Ammunition Plant, Wilmington, Illinois

INTRODUCTION

This Data Quality Evaluation Report presents the assessment and verification of analytical data collected from groundwater sampling conducted for site-wide long-term monitoring at the Joliet Army Ammunition Plant (JOAAP) in Wilmington, Illinois. The data evaluation was completed on the groundwater analytical data generated from samples collected on November 18, 2014 and received by the laboratory on November 19, 2014. The samples were analyzed by TestAmerica Laboratories, Inc., located in Arvada, Colorado. Results have been reported in laboratory report number 280-62703-1.

Groundwater samples were analyzed for volatile organic compounds (VOCs) using *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) Method 8260B, semivolatile organic compounds (SVOCs) using SW-846 Method 8270D, explosives using SW-846 Method 8330B, metals using SW-846 Method 6010C, mercury using SW-846 Method 7470A, and anions (nitrate as N and sulfate) using SW-846 Method 9056A**.** Table 1 presents a cross reference of the sample information to the laboratory analytical data package.

Table 1 - Groundwater Samples

Sample ID	Date Sampled	Time Sampled	Lab Sample ID	Analysis	Matrix	Report Date
JP-M13-GWMW809	11/18/2014	1312	280-62703-1	1	water	12/11/2014
JP-M13-GWMW808	11/18/2014	1400	280-62703-2	1	water	12/11/2014
TRIPBLANK-111814	11/18/2014	1200	280-62703-3	2	water	12/11/2014

1. VOCs, SVOCs, explosives, metals, anions
2. VOCs

OVERVIEW

The samples were assessed based on the criteria specified in the *Final Appendix B Quality Assurance Project Plan Update Long-Term Monitoring Plan for the Former Joliet Army Ammunition Plant, Will County, Illinois* (MWH, May 2015) (QAPP), the DoD Quality Systems Manual Version 5.0 (July 2013), and USEPA Contract Laboratory Program National Functional Guidelines in conjunction with the internal laboratory quality control (QC) criteria. Quality checks evaluated included holding times, sample preservation, cooler temperatures, daily tune requirements, internal standards, surrogates, laboratory control samples (LCS), method blanks, trip blank, matrix spike/matrix spike duplicate (MS/MSD) analysis, initial and continuing calibration verifications and blanks (ICV, CCV, ICB, CCB), and QC Method Reporting Limit (QC/MRL) recovery. Level III data review was completed in accordance with the QAPP. A Level IV data review was completed on approximately ten percent of the samples for the entire November 2014 sampling event. A Level IV data review includes a complete reconstruction of the analytical results.

SUMMARY

This section summarizes the data evaluation findings of the laboratory analytical data package. The tables below present the quality control check requirements, the analytes that failed the criteria, analysis flags, and the data to which the validation flags are applied. Each of the quality checks reviewed in the laboratory analytical data package are summarized under each method subheading.

EPA SW-846 Method 8260B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Tuning Requirements

Instrument tuning requirements were met and within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The percent relative standard deviations (%RSD) were less than or equal to 15% for each individual compound and less than or equal to 30% for calibration check compounds (CCC).

In cases where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990, which meets quality control requirements.

The average response factors (RRF) for all system performance check compounds (SPCC) were within quality control requirements.

The RRF and RSD were calculated for each of the seven concentrations and were acceptable. The initial calibration data for several VOCs were verified.

Second Source Calibration Verification (Initial Calibration Verification)

The initial calibration verification (ICV) percent differences (%Ds) were within quality control requirements of less than or equal to 20% for each individual compound.

Continuing Calibration

The project QAPP requires the continuing calibration verification (CCV) to be run every ten samples. However, the CCV was run every twelve hours or less, which is consistent with the method, DoD QSM, and USEPA National Functional Guidelines.

The %Ds for the CCCs and the continuing calibration response factors for the SPCCs were within quality control limits. The %Ds for all compounds were within the quality control requirements of less than or equal to 20%.

The CCV RFs and %D for several VOCs were verified. The CCV recalculations were reviewed and were acceptable.

Blanks

The method blank met quality control requirements of no contamination greater than one-half the reporting limit.

Trip blank results were non-detect for all compounds.

Surrogate Spikes

Surrogate percent recoveries (%R) were within quality control requirements. Surrogate recoveries were recalculated for samples and were acceptable.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. Several VOCs were recalculated and were acceptable.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits. Several VOCs were recalculated and were acceptable.

Internal Standards

The internal standard areas and retention times were within quality control limits.

Quality Control/Method Reporting Limit Check

The quality control/method reporting limit check (QC/MRL) is required to be performed quarterly at a minimum in accordance with the DoD QSM. The QC/MRL was not reported for this method; however, the quarterly check may not be required at this time. The data are not affected.

Sample Results Verification

Approximately 10% of the VOC sample results for the November 2014 sampling event were verified through recalculation of results. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

EPA SW-846 Method 8270D

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Tuning Requirements

Instrument tuning requirements were met and within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The %RSDs were less than or equal to 15% for each individual compound and less than or equal to 30% for CCCs.

In cases where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r2) were greater than or equal to 0.990.

The RRFs for all SPCCs were within quality control requirements.

The RRF and RSD were calculated for each of the eight concentrations and were acceptable. The initial calibration data for several SVOCs were verified.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Ds were within quality control requirements of less than or equal to 20% for each individual compound.

Continuing Calibration

The project QAPP requires the continuing calibration verification (CCV) to be run every ten samples. However, the CCV was run every twelve hours or less, which is consistent with the method, DoD QSM, and USEPA National Functional Guidelines.

The %Ds for all compounds were within the quality control requirements of less than or equal to 20%.

The continuing calibration response factors for SPCCs were within quality control limits.

The %Ds for the CCCs met the quality control requirements.

The CCV RFs and %Ds for several SVOCs were verified. The CCV recalculations were reviewed and were acceptable.

Blanks

The method blank met quality control requirements of no contamination greater than one-half the reporting limit.

Surrogate Spikes

Surrogate %Rs were within quality control requirements. Surrogate recoveries were recalculated for several samples and were acceptable.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements with the following exception:

- The %Rs for benzidine in the MS and MSD were less than the lower control limit. Benzidine was not detected in the parent sample and was qualified with a "UJ" flag.

QC Sample	Compound	%R	Associated Sample	Flag
JP-M13-GWMW809MS/MSD	benzidine	0%/0%	JP-M13-GWMW809	UJ

The RPDs were within quality control requirements with the exception of 4-chloroaniline. Data were not qualified for this. Several SVOCs were recalculated and were acceptable.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits with the following exception:

- The %R for benzidine in the LCS was less than the lower control limit. The laboratory has indicated that benzidine is a known poor performer. Since benzidine was not detected in the associated samples, data were qualified with a "UJ" flag.

QC Sample	Compound	%R	Associated Samples	Flag
LCS 280-254563/2-A	benzidine	22%	JP-M13-GWMW809 JP-M13-GWMW808	UJ UJ

Several SVOCs were recalculated and were acceptable.

Internal Standards

The internal standard areas and retention times were within quality control limits.

Quality Control/Method Reporting Limit Check

The QC/MRL is required to be performed quarterly at a minimum in accordance with the DoD QSM. The QC/MRL was not reported for this method; however, the quarterly check may not be required at this time. The data are not affected.

Sample Results Verification

Approximately 10% of the SVOC sample results for the November 2014 sampling event were verified through recalculation of results. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

EPA SW-846 Method 8330B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The %RSDs were within quality control requirements for both columns. The initial calibration recalculations were reviewed and were acceptable.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Ds were within quality control requirements on both columns.

Continuing Calibration

The CCV %Ds for all compounds were within the quality control requirements of less than or equal to 15% on both columns. The CCV RFs and %Ds for the explosive compounds were recalculated and verified and were acceptable.

Blanks

Method blank analysis met quality control requirements of no detected contamination greater than one-half the reporting limit.

Surrogate Spikes

Surrogate %Rs were within quality control requirements. Surrogate recoveries were recalculated and were acceptable.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements with the following exception:

- The %Rs for 2-nitrotoluene and tetryl in the MS were less than the lower control limit. These compounds were not detected in the parent sample and were qualified with a "UJ" flag.

The RPDs were within quality control requirements.

QC Sample	Compound	%R	Associated Sample	Flag
JP-M13-GWMW809MS/MSD	2-nitrotoluene tetryl	68%/72% 58%/65%	JP-M13-GWMW809	UJ UJ

The explosive compounds were recalculated and were acceptable.

<u>Laboratory Control Sample</u>

The %Rs for the LCS were within quality control limits. The explosive compounds were recalculated and were acceptable.

<u>Sample Analysis</u>

Sample analysis met method requirements for secondary column confirmation and dilutions. The retention times were within the quality control requirements. The RPDs between the primary and secondary columns were within the quality control limit of less than or equal to 40% in samples.

<u>Sample Results Verification</u>

Approximately 10% of the explosives sample results for the November 2014 sampling event were verified through recalculation of results. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

EPA SW-846 Method 6010C

<u>Holding Time/Sample Preservation</u>

Holding time requirements were met and cooler temperatures were within quality control requirements.

<u>Initial Calibration</u>

Initial calibrations were within quality control requirements. Recalculations of the correlation coefficients for metals were acceptable.

<u>Second Source Calibration Verification (Initial Calibration Verification)</u>

The ICV %Rs were within quality control requirements.

<u>Continuing Calibration</u>

Continuing calibration %Rs were within quality control requirements. Recalculations of the CCV for metals were acceptable.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements with the following exceptions:

- Sodium was detected in the method blank at a concentration less than one-half the reporting limit. The associated samples had a concentration of sodium that was three orders of magnitude greater than in the method blank; therefore, sodium was not qualified.
- Zinc was detected in the method blank at a concentration less than one-half the reporting limit. Zinc was detected in sample JP-M13-GWMW809 at a concentration comparable to that in the method blank. Zinc was qualified with a “B” flag in this sample.
- Sodium was detected in CCBs at concentrations less than one-half the reporting limit. The associated samples had a concentration of sodium that was three orders of magnitude greater than in the CCB; therefore, sodium was not qualified.

Compound	QC Sample	Concentration	Associated Samples	Concentration	Flag
Zinc	method blank	5.86 J ug/L	JP-M13-GWMW809	5.0 J ug/L	B

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPDs were within quality control requirements. MS recovery results for metals analyses were verified through recalculations and were acceptable.

Laboratory Control Sample

The %Rs for the LCS were within quality control requirements. LCS recalculations for metals were acceptable.

CRQL Check Standard

The CRQL check standard met quality control requirements.

The serial dilution was not calculable for most metals. The reported calculated %D was within quality control requirements for Mg. The post digestion spike analysis was performed.

The post digestion spike was within quality control requirements.

Interelement Check Standard

The interference check standard (ICSA) met quality control requirements with the exception that cadmium, chromium , manganese, antimony, and vanadium were detected at a level greater than the LOD for analytical batch 280-256565. The case narrative indicates that the laboratory believes the solution contains trace impurities of these elements and that the results are not due to matrix interference. The results are consistent with those found by the manufacturer of the solution. The associated sample results were not qualified.

Sample Results Verification

Approximately 10% of the metals sample results for the November 2014 sampling event were verified. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

EPA SW-846 Method 7470A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration %Rs were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements. Recalculations of the CCV for mercury were acceptable.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPD was within quality control requirements. The MS recovery result for mercury was verified through recalculation and was acceptable.

Laboratory Control Sample

The %R for the LCS was within quality control requirements.

Sample Results Verification

Approximately 10% of the mercury sample results for the November 2014 sampling event were verified. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

EPA SW-846 Method 9056A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration met quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met quality control requirements of no detected contamination greater than one-half the reporting limit.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPDs were within quality control requirements. MS/MSD recovery results were verified through recalculations and were acceptable.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %Rs for the LCS and LCSD were within quality control requirements. The RPDs were within quality control requirements. Recalculation of the LCS was acceptable.

Quality Control/Method Reporting Limit Check

The MRL results met quality control requirements.

All other acceptance criteria were met for the general chemistry data as reported.

Sample Results Verification

Approximately 10% of the anion sample results for the November 2014 sampling event were verified. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

Summary

Based on the data validation presented herein, and the QC requirements as specified in the project QAPP and guidance documents, data is considered usable as qualified and noted above.

Data Quality Evaluation of Analytical Data for Environmental Remediation Services

Contract No. W9124J-14-P-0142
Site-Wide Long-Term Groundwater Monitoring at Joliet Army Ammunition Plant, Wilmington, Illinois

INTRODUCTION

This Data Quality Evaluation Report presents the assessment and verification of analytical data collected from groundwater sampling conducted for site-wide long-term monitoring at the Joliet Army Ammunition Plant (JOAAP) in Wilmington, Illinois. The data evaluation was completed on the groundwater analytical data generated from samples collected on November 19, 2014 and received by the laboratory on November 20, 2014. The samples were analyzed by TestAmerica Laboratories, Inc., located in Arvada, Colorado. Results have been reported in laboratory report number 280-62756-1.

Groundwater samples were analyzed for volatile organic compounds (VOCs) using *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) Method 8260B, semivolatile organic compounds (SVOCs) using SW-846 Method 8270D, explosives using SW-846 Method 8330B, metals using SW-846 Method 6010C, mercury using SW-846 Method 7470A, and anions (nitrate as N and sulfate) using SW-846 Method 9056A**.** Table 1 presents a cross reference of the sample information to the laboratory analytical data package.

Table 1 - Groundwater Samples

Sample ID	Date Sampled	Time Sampled	Lab Sample ID	Analysis	Matrix	Report Date
JP-M13-GWMW807	11/19/2014	0900	280-62756-1	1	water	12/15/2014
JP-M13-GWMW806	11/19/2014	0935	280-62756-2	1	water	12/15/2014
JP-M13-GWMW811	11/19/2014	1020	280-62756-3	1	water	12/15/2014
JP-M13-GWMW126R	11/19/2014	1155	280-62756-4	1	water	12/15/2014
JP-M13-GWMW999	11/19/2014	1100	280-62756-5	1	water	12/15/2014
JP-M13-GWMW362	11/19/2014	1235	280-62756-6	1	water	12/15/2014
TRIP BLANK-111914	11/19/2014	0800	280-62756-7	2	water	12/15/2014

1. VOCs, SVOCs, explosives, metals, anions
2. VOCs

OVERVIEW

The samples were assessed based on the criteria specified in the *Final Appendix B Quality Assurance Project Plan Update Long-Term Monitoring Plan for the Former Joliet Army Ammunition Plant, Will County, Illinois* (MWH, May 2015) (QAPP), the DoD Quality Systems Manual Version 5.0 (July 2013), and USEPA Contract Laboratory Program National Functional Guidelines in conjunction with the internal laboratory quality control (QC) criteria. Quality checks evaluated included holding times, sample preservation, cooler temperatures, daily tune requirements, internal standards, surrogates, laboratory control samples (LCS), method blanks, trip blank, matrix spike/matrix spike duplicate (MS/MSD) analysis, initial and continuing calibration verifications and blanks (ICV, CCV, ICB, CCB), and QC Method Reporting Limit (QC/MRL) recovery. Level III data review was completed in accordance with the QAPP.

SUMMARY

This section summarizes the data evaluation findings of the laboratory analytical data package. The tables below present the quality control check requirements, the analytes that failed the criteria, analysis flags, and the data to which the validation flags are applied. Each of the quality checks reviewed in the laboratory analytical data package are summarized under each method subheading.

EPA SW-846 Method 8260B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Tuning Requirements

Instrument tuning requirements were met and within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The percent relative standard deviations (%RSD) were less than or equal to 15% for each individual compound and less than or equal to 30% for calibration check compounds (CCC).

In cases where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990, which meets quality control requirements.

The average response factors (RRF) for all system performance check compounds (SPCC) were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The initial calibration verification (ICV) percent differences (%Ds) were within quality control requirements of less than or equal to 20% for each individual compound.

Continuing Calibration

The project QAPP requires the continuing calibration verification (CCV) to be run every ten samples. However, the CCV was run every twelve hours or less, which is consistent with the method, DoD QSM, and USEPA National Functional Guidelines.

The %Ds for the CCCs and the continuing calibration response factors for the SPCCs were within quality control limits. The %Ds for all compounds were within the quality control requirements of less than or equal to 20%.

Blanks

The method blank met quality control requirements of no contamination greater than one-half the reporting limit.

Trip blank results were non-detect for all compounds.

Surrogate Spikes

Surrogate percent recoveries (%R) were within quality control requirements.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits.

Internal Standards

The internal standard areas and retention times were within quality control limits.

Quality Control/Method Reporting Limit Check

The quality control/method reporting limit check (QC/MRL) is required to be performed quarterly at a minimum in accordance with the DoD QSM. The QC/MRL was not reported for this method; however, the quarterly check may not be required at this time. The data are not affected.

EPA SW-846 Method 8270D

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Tuning Requirements

Instrument tuning requirements were met and within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The %RSDs were less than or equal to 15% for each individual compound and less than or equal to 30% for CCCs.

In cases where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r2) were greater than or equal to 0.990.

The RRFs for all SPCCs were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Ds were within quality control requirements of less than or equal to 25% for each individual compound.

Continuing Calibration

The project QAPP requires the continuing calibration verification (CCV) to be run every ten samples. However, the CCV was run every twelve hours or less, which is consistent with the method, DoD QSM, and USEPA National Functional Guidelines.

The %Ds for all compounds were within the quality control requirements of less than or equal to 20%.

The continuing calibration response factors for SPCCs were within quality control limits.

The %Ds for the CCCs met the quality control requirements.

Blanks

The method blank met quality control requirements of no contamination greater than one-half the reporting limit.

Surrogate Spikes

Surrogate %Rs were within quality control requirements.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits with the following exception:

- The %R for benzidine in the LCS was less than the lower control limit. The laboratory has indicated that benzidine is a known poor performer. Since benzidine was not detected in the associated samples, data were qualified with a "UJ" flag.

QC Sample	Compound	%R	Associated Samples	Flag
LCS 280-254563/2-A	benzidine	22%	JP-M13-GWMW807 JP-M13-GWMW806 JP-M13-GWMW811 JP-M13-GWMW126R JP-M13-GWMW999 JP-M13-GWMW362	UJ (all nondetects)

Internal Standards

The internal standard areas and retention times were within quality control limits.

Quality Control/Method Reporting Limit Check

The QC/MRL is required to be performed quarterly at a minimum in accordance with the DoD QSM. The QC/MRL was not reported for this method; however, the quarterly check may not be required at this time. The data are not affected.

EPA SW-846 Method 8330B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The %RSDs were within quality control requirements for both columns.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Ds were within quality control requirements on both columns.

Continuing Calibration

The CCV %Ds for all compounds were within the quality control requirements of less than or equal to 15% on both columns.

Blanks

Method blank analysis met quality control requirements of no detected contamination greater than one-half the reporting limit. However, 2-amino-4,6-dinitrotoluene was detected in a method blank at 0.0804 J ug/L, which was less than one-half the reporting limit. This compound was either not detected in the associated samples or was detected in the sample at a concentration that was more than an order of magnitude greater than in the method blank. No data were qualified.

Surrogate Spikes

Surrogate %Rs were within quality control requirements with the following exceptions:

- The %R for surrogate 1,2-dinitrobenzene in sample JP-M13-GWMW999 was greater than the upper quality control limit on the primary column. Compounds that were detected were qualified with a “J” flag.
- The %R for surrogate 1,2-dinitrobenzene in sample JP-M13-GWMW362 was greater than the upper quality control limit on the primary column. Compounds that were detected were qualified with a “J” flag.

Surrogate	%R	Acceptance Limits	Associated Compound	Associated Samples	Flag
1,2-dinitrobenzene	498%	83%-119%	2,4-dinitrotoluene 2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene 4-amino-2,6-dinitrotoluene	JP-M13-GWMW999	J for detects
1,2-dinitrobenzene	467%	83%-119%	2,4-dinitrotoluene 2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene 2-nitrotoluene 4-amino-2,6-dinitrotoluene	JP-M13-GWMW362	J for detects

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits with the following exception:

- The %R for 2-amino-4,6-dinitrotoluene was less than the lower control limit in LCS 280-254702/2-A. The laboratory has stated that the recovery for 2-amino-4,6-dinitrotoluene was within the laboratory’s historical limits and therefore re-extraction and/or reanalysis was not performed. The associated sample results were qualified with a “J” flag for the detects and a “UJ” flag for the non-detects.

QC Sample	Compound	%R	Associated Sample	Flag
LCS 280-254702/2-A	2-amino-4,6-dinitrotoluene	70%	JP-M13-GWMW807 JP-M13-GWMW806 JP-M13-GWMW811 JP-M13-GWMW126R JP-M13-GWMW999 JP-M13-GWMW362	J (all detects) UJ (all non-detects)

Sample Analysis

Sample analysis met method requirements for secondary column confirmation and dilutions. The retention times were within the quality control requirements. The RPDs between the primary and secondary columns were within the quality control limit of less than or equal to 40% in samples.

EPA SW-846 Method 6010C

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibrations were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements with the following exceptions:

- Manganese was detected in the method blank at a concentration less than one-half the reporting limit. The associated samples had a concentration of manganese that was one or two orders of magnitude greater than in the method blank; therefore, manganese was not qualified.
- Silver was detected in the method blank at a concentration less than one-half the reporting limit. Silver was detected in all field samples at a concentration comparable to that in the method blank. Silver was qualified with a “B” flag in all field samples.
- Calcium was detected in the method blank at a concentration less than one-half the reporting limit. The associated samples had a concentration of calcium that was four orders of magnitude greater than in the method blank; therefore, calcium was not qualified.
- Arsenic was detected in a CCB at a concentration less than one-half the reporting limit. The associated samples were nondetect for arsenic and were not qualified. Silver was detected in CCBs at concentrations

less than one-half the reporting limit. All associated samples were qualified with a “B” flag as already noted for method blank contamination. Calcium, magnesium, and sodium were detected in CCBs at concentrations less than one-half the reporting limit. The associated samples had concentrations of calcium, magnesium, and sodium that were four orders of magnitude greater than in the CCBs; therefore, these analytes were not qualified.

Compound	QC Sample	Concentration	Associated Samples	Concentration	Flag
Silver	Method Blank	1.23 J ug/L	JP-M13-GWMW807	1.0 J ug/L	B
			JP-M13-GWMW806	1.3 J ug/L	B
			JP-M13-GWMW811	1.4 J ug/L	B
			JP-M13-GWMW126R	1.4 J ug/L	B
			JP-M13-GWMW999	1.7 J ug/L	B
			JP-M13-GWMW362	1.8 J ug/L	B

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements with the following exceptions:

- The %Rs for aluminum, beryllium, manganese, zinc, and thallium in the MS were less than the lower control limit. The %Rs for aluminum and thallium in the MSD were less than the lower control limit. Analytes in the parent sample (JP-M13-GWMW807) were qualified with a “J” flag for the detects and a “UJ” flag for the nondetects.
- The %Rs for calcium and sodium in the MS were less than the lower control limit. The %R for sodium in the MSD was greater than the upper control limit. Calcium and sodium in the parent sample exceeded four times the spiking amount. Consequently, calcium and sodium were not qualified in the sample.

QC Sample	Compound	%R	Associated Sample	Flag
JP-M13-GWMW807MS/MSD	Aluminum	83%/85%	JP-M13-GWMW807	UJ
	Beryllium	86%/89%		UJ
	Manganese	89%/94%		J
	Zinc	85%/87%		J
	Thallium	84%/83%		UJ

The RPDs were within quality control requirements.

Laboratory Control Sample

The %Rs for the LCS were within quality control requirements.

CRQL Check Standard

The CRQL check standard met quality control requirements.

The serial dilution was not calculable for most metals. The reported calculated %D was within quality control requirements for Mg and Ca. The post digestion spike analysis was performed.

The post digestion spike was within quality control requirements with the exception that magnesium was recovered below the lower control limit. Magnesium in the parent sample exceeded four times the spiking amount. Consequently, magnesium was not qualified in the sample.

Interelement Check Standard

The interference check standard (ICSA) met quality control requirements with the exception that cadmium, chromium, and manganese were detected at a level greater than the LOD for analytical batch 280-256627. Copper was detected at a level greater than the LOD for analytical batch 280-256848. The case narrative indicates that the laboratory believes the solutions contain trace impurities of these elements and that the results are not due to matrix interference. The results are consistent with those found by the manufacturer of the solution. The associated sample results were not qualified.

EPA SW-846 Method 7470A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration %Rs were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPD was within quality control requirements.

Laboratory Control Sample

The %R for the LCS was within quality control requirements.

EPA SW-846 Method 9056A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration met quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met quality control requirements of no detected contamination greater than one-half the reporting limit.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPDs were within quality control requirements.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %Rs for the LCS and LCSD were within quality control requirements. The RPDs were within quality control requirements.

Quality Control/Method Reporting Limit Check

The MRL results met quality control requirements.

All other acceptance criteria were met for the general chemistry data as reported.

Summary

Based on the data validation presented herein, and the QC requirements as specified in the project QAPP and guidance documents, data is considered usable as qualified and noted above.

Data Quality Evaluation of Analytical Data for Environmental Remediation Services

Contract No. W9124J-14-P-0142
Site-Wide Long-Term Groundwater Monitoring at Joliet Army Ammunition Plant, Wilmington, Illinois

INTRODUCTION

This Data Quality Evaluation Report presents the assessment and verification of analytical data collected from groundwater sampling conducted for site-wide long-term monitoring at the Joliet Army Ammunition Plant (JOAAP) in Wilmington, Illinois. The data evaluation was completed on the groundwater analytical data generated from samples collected on December 8 and 9, 2014 and received by the laboratory on December 10, 2014. The samples were analyzed by Test America Laboratories, Inc., located in Arvada, Colorado. Results have been reported in laboratory report number 280-63477-1.

Groundwater samples were analyzed for explosives using *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) Method 8330B and sulfate using SW-846 Method 9056A. Table 1 presents a cross reference of the sample information to the laboratory analytical data package.

Table 1 - Groundwater Samples

Sample ID	Date Sampled	Time Sampled	Lab Sample ID	Analysis	Matrix	Report Date
JP-M1-GWMW641	12/08/2014	1126	280-63477-1	1	water	01/05/2015
JP-M1-GWMW642	12/08/2014	1125	280-63477-2	1	water	01/05/2015
JP-M1-GWMW644	12/08/2014	1156	280-63477-3	1	water	01/05/2015
JP-M1-GWMW643	12/08/2014	1217	280-63477-4	1	water	01/05/2015
JP-M1-GWMW999	12/08/2014	1200	280-63477-5	1	water	01/05/2015
JP-M1-SW709	12/08/2014	1230	280-63477-6	1	water	01/05/2015
JP-M1-GWMW648	12/08/2014	1305	280-63477-7	1	water	01/05/2015
JP-M1-GWMW231	12/08/2014	1425	280-63477-8	1	water	01/05/2015
JP-M1-GWMW649	12/08/2014	1415	280-63477-9	1	water	01/05/2015
JP-M1-GWMW108	12/08/2014	1505	280-63477-10	1	water	01/05/2015
JP-M1-GWMW640	12/08/2014	1507	280-63477-11	1	water	01/05/2015
JP-M1-GWMW646	12/08/2014	1550	280-63477-12	1	water	01/05/2015
JP-M1-GWMW645	12/08/2014	1550	280-63477-13	1	water	01/05/2015
JP-L14-GWMW511	12/09/2014	0930	280-63477-14	2	water	01/05/2015
JP-L14-GWH7	12/09/2014	0925	280-63477-15	2	water	01/05/2015

Sample ID	Date Sampled	Time Sampled	Lab Sample ID	Analysis	Matrix	Report Date
JP-L14-GWMW512	12/09/2014	1002	280-63477-16	2	water	01/05/2015
JP-L1-GWMW173	12/09/2014	1135	280-63477-17	2	water	01/05/2015
JP-L1-GWWES3	12/09/2014	1130	280-63477-18	2	water	01/05/2015
JP-L1-SW550	12/09/2014	1210	280-63477-19	2	water	01/05/2015

Sample Analysis
1. Sulfate
2. Explosives

OVERVIEW

The samples were assessed based on the criteria specified in the *Final Appendix B Quality Assurance Project Plan Update Long-Term Monitoring Plan for the Former Joliet Army Ammunition Plant, Will County, Illinois* (MWH, May 2015) (QAPP), the DoD Quality Systems Manual Version 5.0 (July 2013), and USEPA Contract Laboratory Program National Functional Guidelines in conjunction with the internal laboratory quality control (QC) criteria. Quality checks evaluated included holding times, sample preservation, cooler temperatures, surrogates, laboratory control samples (LCS), method blanks, matrix spike/matrix spike duplicate (MS/MSD) analysis, initial and continuing calibration verifications and blanks (ICV, CCV, ICB, CCB), and QC Method Reporting Limit (QC/MRL) recovery. Level III data review was completed in accordance with the QAPP.

SUMMARY

This section summarizes the data evaluation findings of the laboratory analytical data package. The tables below present the quality control check requirements, the analytes that failed the criteria, analysis flags, and the data to which the validation flags are applied. Each of the quality checks reviewed in the laboratory analytical data package are summarized under each method subheading.

EPA SW-846 Method 8330B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The percent relative standard deviations (%RSD) were within quality control requirements for both columns.

Second Source Calibration Verification (Initial Calibration Verification)

The initial calibration verification (ICV) percent differences (%Ds) were within quality control requirements on both columns.

Continuing Calibration

The continuing calibration verification (CCV) %Ds for all compounds were within the quality control requirements of less than or equal to 15% on both columns.

Blanks

Method blank analysis met quality control requirements of no detected contamination greater than one-half the reporting limit. The compound 2-nitrotoluene was detected in a method blank at less than one-half the reporting limit. This compound was not detected in any of the associated samples; therefore, no data were qualified.

Surrogate Spikes

Surrogate percent recoveries (%Rs) were within quality control requirements.

Matrix Spikes/Matrix Spike Duplicates

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %Rs for the LCS and LCSD were within quality control limits with the following exception:

- The %R for 2-amino-4,6-dinitrotoluene was less than the lower control limit in LCS 280-256855/2-A and LCSD 280-256855/3-A. The laboratory has stated that the recovery for 2-amino-4,6-dinitrotoluene was within the laboratory's historical limits and therefore re-extraction and/or reanalysis was not performed. The associated sample results were qualified with a "J" flag for the detects and a "UJ" flag for the non-detects. The RPDs were within quality control requirements.

QC Sample	Compound	%R	Associated Sample	Flag
LCS 280-256855/2-A/LCSD 280-256855/3-A	2-amino-4,6-dinitrotoluene	72%/78%	JP-L14-GWMW511	UJ
			JP-L14-GWH7	UJ
			JP-L14-GWMW512	J
			JP-L1-GWMW173	J
			JP-L1-GWWES3	J
			JP-L1-SW550	UJ

Sample Analysis

Sample analysis met method requirements for secondary column confirmation and dilutions. The retention times were within the quality control requirements. The RPDs between the primary and secondary columns were within the quality control limit of less than or equal to 40% in samples.

EPA SW-846 Method 9056A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration met quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met quality control requirements with the exception that sulfate was detected in one CCB at a level greater than one-half the RL. Sulfate was detected in the associated sample at a concentration greater than ten times the concentration in the CCB. Data were not qualified.

Matrix Spike/Matrix Spike Duplicate Analysis

The %Rs for the MS and MSD samples were within quality control requirements. The RPD was within quality control requirements.

Laboratory Control Sample

The %Rs for the LCS and LCSD were within quality control requirements. The RPD was within quality control requirements.

Quality Control/Method Reporting Limit Check

The MRL results met quality control requirements.

All other acceptance criteria were met for the general chemistry data as reported.

Summary

Based on the data validation presented herein, and the QC requirements as specified in the project QAPP and guidance documents, data is considered usable as qualified and noted above.

Data Quality Evaluation of Analytical Data for Environmental Remediation Services

Contract No. W9124J-14-P-0142
Site-Wide Long-Term Groundwater Monitoring at Joliet Army Ammunition Plant, Wilmington, Illinois

INTRODUCTION

This Data Quality Evaluation Report presents the assessment and verification of analytical data collected from groundwater sampling conducted for site-wide long-term monitoring at the Joliet Army Ammunition Plant (JOAAP) in Wilmington, Illinois. The data evaluation was completed on the groundwater analytical data generated from samples collected on December 9 and 10, 2014 and received by the laboratory on December 11, 2014. The samples were analyzed by TestAmerica Laboratories, Inc., located in Arvada, Colorado. Results have been reported in laboratory report number 280-63514-1.

Groundwater samples were analyzed for explosives using *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) Method 8330B, metals using SW-846 Method 6010C, and mercury using SW-846 Method 7470A. Table 1 presents a cross reference of the sample information to the laboratory analytical data package.

Table 1 - Groundwater Samples

Sample ID	Date Sampled	Time Sampled	Lab Sample ID	Analysis	Matrix	Report Date
JP-L1-GWWES1	12/09/2014	1505	280-63514-1	1	water	01/07/2015
JP-L1-GWMW174	12/09/2014	1425	280-63514-2	1	water	01/07/2015
JP-L1-GWMW131	12/09/2014	1503	280-63514-3	1	water	01/07/2015
JP-L3-GWMW410	12/10/2014	0907	280-63514-4	1	water	01/07/2015
JP-L3-GWMW998	12/10/2014	1030	280-63514-5	2	water	01/07/2015
JP-L3-GWMW631	12/10/2014	1000	280-63514-6	2	water	01/07/2015
JP-L3-GWMW630	12/10/2014	1030	280-63514-7	2	water	01/07/2015
JP-L3-GWMW997	12/10/2014	1200	280-63514-8	2	water	01/07/2015
JP-L3-GWMW412	12/10/2014	1130	280-63514-9	2	water	01/07/2015
JP-L3-SW557	12/10/2014	1100	280-63514-10	2	water	01/07/2015
JP-L3-SW558	12/10/2014	1115	280-63514-11	2	water	01/07/2015
JP-L3-SW777	12/10/2014	1130	280-63514-12	2	water	01/07/2015
JP-L3-GWMW633	12/10/2014	1215	280-63514-13	2	water	01/07/2015

Sample Analysis
1. Explosives
2. Explosives and metals

OVERVIEW

The samples were assessed based on the criteria specified in the *Final Appendix B Quality Assurance Project Plan Update Long-Term Monitoring Plan for the Former Joliet Army Ammunition Plant, Will County, Illinois* (MWH, May 2015) (QAPP), the DoD Quality Systems Manual Version 5.0 (July 2013), and USEPA Contract Laboratory Program

National Functional Guidelines in conjunction with the internal laboratory quality control (QC) criteria. Quality checks evaluated included holding times, sample preservation, cooler temperatures, surrogates, laboratory control samples (LCS), method blanks, matrix spike/matrix spike duplicate (MS/MSD) analysis, initial and continuing calibration verifications and blanks (ICV, CCV, ICB, CCB), and QC Method Reporting Limit (QC/MRL) recovery. Level III data review was completed in accordance with the QAPP.

SUMMARY

This section summarizes the data evaluation findings of the laboratory analytical data package. The tables below present the quality control check requirements, the analytes that failed the criteria, analysis flags, and the data to which the validation flags are applied. Each of the quality checks reviewed in the laboratory analytical data package are summarized under each method subheading.

EPA SW-846 Method 8330B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The percent relative standard deviations (%RSD) were within quality control requirements for both columns.

Second Source Calibration Verification (Initial Calibration Verification)

The initial calibration verification (ICV) percent differences (%Ds) were within quality control requirements on both columns.

Continuing Calibration

The continuing calibration verification (CCV) %Ds for all compounds were within the quality control requirements of less than or equal to 15% on both columns.

Blanks

Method blank analysis met quality control requirements of no detected contamination greater than one-half the reporting limit. The compound 2-nitrotoluene was detected in a method blank at less than one-half the reporting limit. This compound was not detected in any of the associated samples; therefore, no data were qualified.

Surrogate Spikes

Surrogate %Rs were within quality control requirements with the following exceptions:

- The %R for surrogate 1,2-dinitrobenzene in sample JP-L1-GWWES1 was less than the lower quality control limit on the confirmation column. The case narrative indicates that there was evidence of matrix interference and therefore re-extraction/reanalysis was not performed. The surrogate was within control limits on the primary column; therefore, results were not qualified.
- The %R for surrogate 1,2-dinitrobenzene in sample JP-L1-GWMW131 was less than the lower quality control limit on the primary and confirmation columns. The case narrative indicates that there was evidence of matrix interference and therefore re-extraction/reanalysis was not performed. Compounds that

were detected were qualified with a "J" flag and compounds that were nondetect were qualified with a "UJ" flag.

Surrogate	%R	Acceptance Limits	Associated Compound	Associated Samples	Flag
1,2-dinitrobenzene	0%	83%-119%	1,3dinitrobenzene	JP-L1-GWMW131	J
			2,4,6-trinitrotoluene		J
			2,6-dinitrotoluene		UJ
			2-nitrotoluene		UJ
			3-nitrotoluene		UJ
			4-amino-2,6-dinitrotoluene		UJ
			RDX		UJ
			1,3,5-trinitrobenzene		J
			2,4-dinitrotoluene		UJ
			2-amino-4,6-dinitrotoluene		J
			4-nitrotoluene		UJ
			HMX		UJ
			nitrobenzene		UJ
			tetryl		J

Matrix Spikes/Matrix Spike Duplicates

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %Rs for the LCS and LCSD were within quality control limits with the following exception:

- The %R for 2-amino-4,6-dinitrotoluene was less than the lower control limit in LCS 280-256855/2-A and LCSD 280-256855/3-A. The laboratory has stated that the recovery for 2-amino-4,6-dinitrotoluene was within the laboratory's historical limits and therefore re-extraction and/or reanalysis was not performed. The associated sample results were qualified with a "J" flag for the detects and a "UJ" flag for the non-detects. The RPDs were within quality control requirements.

QC Sample	Compound	%R	Associated Sample	Flag
LCS 280-256855/2-A/LCSD 280-256855/3-A	2-amino-4,6-dinitrotoluene	72%/78%	JP-L1-GWWES1	J
			JP-L1-GWMW174	UJ
			JP-L1-GWMW131	J
			JP-L3-GWMW410	UJ
			JP-L3-GWMW998	UJ
			JP-L3-GWMW631	UJ
			JP-L3-GWMW630	UJ
			JP-L3-GWMW997	UJ
			JP-L3-GWMW412	J
			JP-L3-SW557	UJ
			JP-L3-SW558	UJ
			JP-L3-SW777	UJ
			JP-L3-GWMW633	UJ

Sample Analysis

Sample analysis met method requirements for secondary column confirmation and dilutions, with the following exceptions:

- The %RPD between the primary and confirmation columns exceeded 40% for 1,3,5-trinitrobenzene in sample JP-L1-GWWES1. The chromatograms for sample JP-L1-GWWES1 indicate interference for both columns for 1,3,5-trinitrobenzene; consequently, the lower concentration has been reported. This compound was qualified with a “J” flag.

- The %RPD between the primary and confirmation columns exceeded 40% for 1,3-dinitrobenzene; 1,3,5-trinitrobenzene; 2-amino-4,6-dinitrotoluene; and tetryl in sample JP-L1-GWMW131. The chromatograms for sample JP-L1-GWMW131 indicate interference for both columns for 1,3-dinitrobenzene; 1,3,5-trinitrobenzene; 2-amino-4,6-dinitrotoluene; and tetryl; consequently, the lower concentration has been reported for each compound. These compounds were qualified with a “J” flag.

Date	Compound	%RPD	Associated Samples	Flag
12/14/2014	1,3,5-trinitrobenzene	67.7%	JP-L1-GWWES1	J
12/14/2014	1,3,5-trinitrobenzene 1,3-dinitrobenzene tetryl 2-amino-4,6-dinitrotoluene	55.9% 70.7% 198.4% 164.1%	JP-L1-GWMW131	J J J J

- The laboratory has indicated in the case narrative that based on a review of the chromatograms of sample JP-L1-GWMW131, it was the opinion of the analyst that matrix interferences might be causing false positive and/or false negative results. This sample was analyzed at a 10X dilution and a 200X dilution. Results should be reported from the undiluted analysis.

- RDX and HMX were out of calibration range in Sample JP-L3-GWMW412. This sample was analyzed at a 10X dilution. RDX and HMX should be reported from this dilution.

EPA SW-846 Method 6010C

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibrations were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements with the following exceptions:

- Arsenic was detected in the method blank at a concentration less than one-half the reporting limit. Arsenic was not detected in any of the associated samples; therefore, results were not qualified.
- Silver was detected in the method blank at a concentration less than one-half the reporting limit. Silver was detected in several of the associated samples at a concentration comparable to that in the method blank. Silver was qualified with a "B" flag in these samples.
- Silver was detected in CCBs at concentrations less than one-half the reporting limit. All associated samples were qualified with a "B" flag as already noted for method blank contamination.

Compound	QC Sample	Concentration	Associated Samples	Concentration	Flag
Silver	method blank	1.16 J ug/L	JP-L3GWMW998	1.1 J ug/L	B
			JP-L3-GWMW631	1.2 J ug/L	B
			JP-L3-GWMW997	1.4 J ug/L	B
			JP-L3-GWMW412	1.1 J ug/L	B
			JP-L3-SW557	0.96 J ug/L	B
			JP-L3-SW558	1.7 J ug/L	B
			JP-L3-SW777	0.96 J ug/L	B
			JP-L3-GWMW633	1.5 J ug/L	B

Matrix Spike/Matrix Spike Duplicate Analysis

The %Rs for the MS and MSD samples were within quality control requirements with the following exception:

- The %R for vanadium in the MS and MSD was greater than the upper control limit. Vanadium was not detected in the parent sample (JP-L3-GWMW631) and consequently was not qualified in the sample.

The RPDs were within quality control requirements.

Laboratory Control Sample

The %Rs for the LCS were within quality control requirements.

CRQL Check Standard

The CRQL check standard met quality control requirements.

The serial dilution was not calculable for most metals (Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Fe, K, Mn, Na, Ni, Pb, Sb, Se, Tl, V, and Zn). The reported calculated %Ds were within quality control requirements for Ca and Mg. The post digestion spike analysis was performed.

The post digestion spike was within quality control requirements.

Interelement Check Standard

The interference check standard (ICSA) met quality control requirements with the exception that cadmium, chromium, manganese, and vanadium were detected at a level greater than the LOD. The case narrative indicates that the laboratory believes the solution contains trace impurities of these elements and that the results are not due to matrix interference. The results are consistent with those found by the manufacturer of the solution. The associated sample results were not qualified.

EPA SW-846 Method 7470A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration %Rs were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements.

Matrix Spikes/Matrix Spike Duplicates

The %Rs for the MS and MSD samples were within quality control requirements. The RPDs were within quality control requirements.

Laboratory Control Sample

The %Rs for the LCS were within quality control requirements.

Summary

Based on the data validation presented herein, and the QC requirements as specified in the project QAPP and guidance documents, data is considered usable as qualified and noted above.

Data Quality Evaluation of Analytical Data for Environmental Remediation Services

Contract No. W9124J-14-P-0142
Site-Wide Long-Term Groundwater Monitoring at Joliet Army Ammunition Plant, Wilmington, Illinois

INTRODUCTION

This Data Quality Evaluation Report presents the assessment and verification of analytical data collected from groundwater sampling conducted for site-wide long-term monitoring at the Joliet Army Ammunition Plant (JOAAP) in Wilmington, Illinois. The data evaluation was completed on the groundwater analytical data generated from samples collected on December 10 and 11, 2014 and received by the laboratory on December 12, 2014. The samples were analyzed by TestAmerica Laboratories, Inc., located in Arvada, Colorado. Results have been reported in laboratory report number 280-63551-1.

Groundwater samples were analyzed for volatile organic compounds (VOCs) using *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) Method 8260B, semivolatile organic compounds (SVOCs) using SW-846 Method 8270D, explosives using SW-846 Method 8330B, metals using SW-846 Method 6010C, mercury using SW-846 Method 7470A, and anions (nitrate as N and sulfate) using SW-846 Method 9056A**.** Table 1 presents a cross reference of the sample information to the laboratory analytical data package.

Table 1 - Groundwater Samples

Sample ID	Date Sampled	Time Sampled	Lab Sample ID	Analysis	Matrix	Report Date
JP-L2-GWMW621	12/10/2014	1445	280-63551-1	1	water	01/09/2015
JP-L2-GWMW620	12/10/2014	1457	280-63551-2	1	water	01/09/2015
JP-L2-GWMW404	12/10/2014	1548	280-63551-3	1	water	01/09/2015
JP-L2-SW555	12/10/2014	1530	280-63551-4	1	water	01/09/2015
JP-M11-GWMW336	12/11/2014	0935	280-63551-5	2	water	01/09/2015
JP-M11-GWMW802	12/11/2014	1030	280-63551-6	2	water	01/09/2015
JP-M11-GWMW804	12/11/2014	1125	280-63551-7	2	water	01/09/2015
JP-M11-GWMW805	12/11/2014	1130	280-63551-8	2	water	01/09/2015
JP-M11-GWMW996	12/11/2014	1200	280-63551-9	2	water	01/09/2015
JP-M11-GWMW335	12/11/2014	1205	280-63551-10	2	water	01/09/2015
TRIP BLANK-12-11-14	12/11/2014	0800	280-63551-11	3	water	01/09/2015

1. explosives
2. VOCs, SVOCs, explosives, metals, anions
3. VOCs

OVERVIEW

The samples were assessed based on the criteria specified in the *Final Appendix B Quality Assurance Project Plan Update Long-Term Monitoring Plan for the Former Joliet Army Ammunition Plant, Will County, Illinois* (MWH, May 2015) (QAPP), the DoD Quality Systems Manual Version 5.0 (July 2013), and USEPA Contract Laboratory Program

National Functional Guidelines in conjunction with the internal laboratory quality control (QC) criteria. Quality checks evaluated included holding times, sample preservation, cooler temperatures, daily tune requirements, internal standards, surrogates, laboratory control samples (LCS), method blanks, trip blank, matrix spike/matrix spike duplicate (MS/MSD) analysis, initial and continuing calibration verifications and blanks (ICV, CCV, ICB, CCB), and QC Method Reporting Limit (QC/MRL) recovery. Level III data review was completed in accordance with the QAPP.

SUMMARY

This section summarizes the data evaluation findings of the laboratory analytical data package. The tables below present the quality control check requirements, the analytes that failed the criteria, analysis flags, and the data to which the validation flags are applied. Each of the quality checks reviewed in the laboratory analytical data package are summarized under each method subheading.

EPA SW-846 Method 8260B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Tuning Requirements

Instrument tuning requirements were met and within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The percent relative standard deviations (%RSD) were less than or equal to 15% for each individual compound and less than or equal to 30% for calibration check compounds (CCC).

In cases where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990, which meets quality control requirements.

The average response factors (RRF) for all system performance check compounds (SPCC) were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The initial calibration verification (ICV) percent differences (%Ds) were within quality control requirements of less than or equal to 20% for each individual compound.

Continuing Calibration

The project QAPP requires the continuing calibration verification (CCV) to be run every ten samples. However, the CCV was run every twelve hours or less, which is consistent with the method, DoD QSM, and USEPA National Functional Guidelines.

The %Ds for the CCCs and the continuing calibration response factors for the SPCCs were within quality control limits. The %Ds for all compounds were within the quality control requirements of less than or equal to 20%.

Blanks

The method blank met quality control requirements of no contamination greater than one-half the reporting limit.

Trip blank results were non-detect for all compounds.

Surrogate Spikes

Surrogate percent recoveries (%R) were within quality control requirements.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits.

Internal Standards

The internal standard areas and retention times were within quality control limits.

Quality Control/Method Reporting Limit Check

The quality control/method reporting limit check (QC/MRL) is required to be performed quarterly at a minimum in accordance with the DoD QSM. The QC/MRL was not reported for this method; however, the quarterly check may not be required at this time. The data are not affected.

EPA SW-846 Method 8270D

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Tuning Requirements

Instrument tuning requirements were met and within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The %RSDs were less than or equal to 15% for each individual compound and less than or equal to 30% for CCCs.

In cases where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r2) were greater than or equal to 0.990.

The RRFs for all SPCCs were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Ds were within quality control requirements of less than or equal to 20% for each individual compound.

Continuing Calibration

The project QAPP requires the continuing calibration verification (CCV) to be run every ten samples. However, the CCV was run every twelve hours or less, which is consistent with the method, DoD QSM, and USEPA National Functional Guidelines.

The %Ds for all compounds were within the quality control requirements of less than or equal to 20%.

The continuing calibration response factors for SPCCs were within quality control limits.

The %Ds for the CCCs met the quality control requirements.

Blanks

The method blank met quality control requirements of no contamination greater than one-half the reporting limit. However, dimethyl phthalate was detected at less than one-half the reporting limit. Dimethyl phthalate was detected in all associated samples at levels comparable to the detection in the method blank. Therefore, all detected dimethyl phthalate results from associated samples were qualified with a "B" flag to denote this contamination.

Compound	QC Sample	Concentration	Associated Samples	Concentration	Flag
Dimethyl phthalate	Method Blank	0.624 J ug/L	JP-M11-GWMW336	0.32 J ug/L	B
			JP-M11-GWMW802	0.21 J ug/L	B
			JP-M11-GWMW804	0.30 J ug/L	B
			JP-M11-GWMW805	0.25 J ug/L	B
			JP-M13-GWMW996	0.26 J ug/L	B
			JP-M11-GWMW335	0.21 J ug/L	B

Surrogate Spikes

Surrogate %Rs were within quality control requirements.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %Rs for the LCS and LCSD were within quality control limits. The RPDs were within quality control requirements.

Internal Standards

The internal standard areas and retention times were within quality control limits.

Quality Control/Method Reporting Limit Check

The QC/MRL is required to be performed quarterly at a minimum in accordance with the DoD QSM. The QC/MRL was not reported for this method; however, the quarterly check may not be required at this time. The data are not affected.

EPA SW-846 Method 8330B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The %RSDs were within quality control requirements for both columns.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Ds were within quality control requirements on both columns.

Continuing Calibration

The CCV %Ds for all compounds were within the quality control requirements of less than or equal to 15% on both columns.

Blanks

Method blank analysis met quality control requirements of no detected contamination greater than one-half the reporting limit with the following exceptions:

- The compound 2-amino-4,6-dinitrotoluene was detected in the method blank at a concentration greater than the reporting limit on the confirmation column. The primary column result was non detect; consequently, the method blank is considered non detect for 2-amino-4,6-dinitrotoluene. No sample results were qualified.
- RDX and 2-nitrotoluene were detected in the method blank at concentrations less than one-half the reporting limit. RDX was either not detected in the associated samples or was an order of magnitude greater than the concentration in the method blank; 2-nitrotoluene was not detected in the associated samples. Consequently, RDX and 2-nitrotoluene were not qualified in the associated samples.

Surrogate Spikes

Surrogate %Rs were within quality control requirements.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %Rs for the LCS and LCSD were within quality control limits with the following exception:

- The %R for tetryl was less than the lower control limit in the LCS and LCSD. The laboratory has stated that the recovery for tetryl was within the laboratory's historical limits and therefore re-extraction and/or reanalysis was not performed. Tetryl was not detected in the associated samples; therefore, tetryl was qualified with a "UJ" flag.

QC Sample	Compound	%R	Associated Sample	Flag
LCS 280-257164/2-A/LCSD 280-257164/3-A	tetryl	30%/25%	JP-L2-GWMW621 JP-L2-GWMW620 JP-L2-GWMW404 JP-L2-SW555 JP-M11-GWMW336 JP-M11-GWMW802 JP-M11-GWMW804 JP-M11-GWMW805 JP-M13-GWMW996 JP-M11-GWMW335	UJ (all non detects)

The RPDS were within quality control requirements.

Sample Analysis

Sample analysis met method requirements for secondary column confirmation and dilutions, with the following exceptions:

- The %RPD between the primary and confirmation columns exceeded 40% for 4-amino-2,6-dinitrotoluene and 2-amino-4,6-dinitrotoluene in sample JP-M11-GWMW804. The chromatograms for sample JP-M11-GWMW804 indicate interference for both columns for 4-amino-2,6-dinitrotoluene and 2-amino-4,6-dinitrotoluene; consequently, the lower concentration has been reported. These compounds were qualified with a "J" flag.

Date	Compound	%RPD	Associated Samples	Flag
12/18/2014	4-amino-2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene	79.8% 156.4%	JP-M11-GWMW804	J J

- HMX and RDX were out of calibration range in Sample JP-L2-GWMW404. This sample was analyzed at a 10X dilution. HMX and RDX should be reported from this dilution.

EPA SW-846 Method 6010C

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibrations were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements with the following exceptions:

- Sodium was detected in the method blank at a concentration less than one-half the reporting limit. The associated samples had concentrations of sodium that were three orders of magnitude greater than in the method blank; therefore, sodium was not qualified.
- Arsenic was detected in a CCB at a concentration less than one-half the reporting limit. Arsenic was not detected in the associated sample ; therefore, no data were qualified.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPDs were within quality control requirements.

Laboratory Control Sample

The %Rs for the LCS were within quality control requirements.

CRQL Check Standard

The CRQL check standard met quality control requirements.

The serial dilution was not calculable for most metals (Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Fe, K, Mn, Na, Ni, Pb, Sb, Se, Tl, V, and Zn). The reported calculated %Ds were within quality control requirements for Ca and Mg. The post digestion spike analysis was performed.

The post digestion spike was within quality control requirements with the exception that calcium and manganese were recovered below the lower control limit. Calcium and manganese were qualified as "J" for sample JP-M11-GWMW336.

QC Sample	Analyte	%R	Associated Sample	Flag
Post Digestion Spike	calcium manganese	74% 79%	JP-M131GWMW336	J J

Interelement Check Standard

The interference check standard (ICSA) met quality control requirements with the exception that cadmium, chromium, copper, and manganese were detected at a level greater than the LOD for analytical batch 280-258935 and cadmium, chromium, copper, manganese, and vanadium were detected at a level greater than the LOD for analytical batch 280-259106. The case narrative indicates that the laboratory believes the solutions contain trace impurities of these elements and that the results are not due to matrix interference. The results are consistent with those found by the manufacturer of the solution. The associated sample results were not qualified.

EPA SW-846 Method 7470A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration %Rs were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPD was within quality control requirements.

Laboratory Control Sample

The %R for the LCS was within quality control requirements.

EPA SW-846 Method 9056A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration met quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met quality control requirements of no detected contamination greater than one-half the reporting limit. Nitrate was detected in a CCB at a concentration less than one-half the reporting limit. The associated samples were either non detect for nitrate or had concentrations of nitrate that were comparable to the concentration in the CCB. The associated samples with detections of nitrate were qualified with a “B” flag.

Compound	QC Sample	Concentration	Associated Samples	Concentration	Flag
Nitrate	CCB	0.0818 J mg/L	JP-M11-GWMW336 JP-M11-GWMW802 JP-M11-GWMW804	0.10 J mg/L 0.092 J mg/L 0.092 J mg/L	B B B

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements with the following exception:

- The %R for sulfate was greater than the upper control limit in the MS and MSD. Sulfate was detected in the parent sample (JP-M11-GWMW804) at a concentration more than four times that of the spiked amount. Consequently, sulfate was not qualified in the parent sample.

The RPDs were within quality control requirements.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %Rs for the LCS and LCSD were within quality control requirements. The RPDs were within quality control requirements.

Quality Control/Method Reporting Limit Check

The MRL results met quality control requirements.

All other acceptance criteria were met for the general chemistry data as reported.

Summary

Based on the data validation presented herein, and the QC requirements as specified in the project QAPP and guidance documents, data is considered usable as qualified and noted above.

Data Quality Evaluation of Analytical Data for Environmental Remediation Services

Contract No. W9124J-14-P-0142
Site-Wide Long-Term Groundwater Monitoring at Joliet Army Ammunition Plant, Wilmington, Illinois

INTRODUCTION

This Data Quality Evaluation Report presents the assessment and verification of analytical data collected from groundwater sampling conducted for site-wide long-term monitoring at the Joliet Army Ammunition Plant (JOAAP) in Wilmington, Illinois. The data evaluation was completed on the groundwater analytical data generated from samples collected on December 15, 2014 and received by the laboratory on December 16, 2014. The samples were analyzed by TestAmerica Laboratories, Inc., located in Arvada, Colorado. Results have been reported in laboratory report number 280-63638-1.

Groundwater samples were analyzed for volatile organic compounds (VOCs) using *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) Method 8260B, semivolatile organic compounds (SVOCs) using SW-846 Method 8270D, explosives using SW-846 Method 8330B, metals using SW-846 Method 6010C, mercury using SW-846 Method 7470A, and anions (nitrate as N and sulfate) using SW-846 Method 9056A**.** Table 1 presents a cross reference of the sample information to the laboratory analytical data package.

Table 1 - Groundwater Samples

Sample ID	Date Sampled	Time Sampled	Lab Sample ID	Analysis	Matrix	Report Date
JP-M11-GWMW803	12/15/2014	1052	280-63638-1	1	water	01/013/2015
JP-M11-GWMW333	12/15/2014	1145	280-63638-2	1	water	01/13/2015
JP-M11-GWMW334	12/15/2014	1140	280-63638-3	1	water	01/13/2015
JP-M13-GWMW808	12/15/2014	1407	280-63638-4	1	water	01/13/2015
JP-M13-GWMW809	12/15/2014	1405	280-63638-5	1	water	01/13/2015
JP-TRIPBLANK-12-15-14	12/15/2014	0800	280-63638-6	2	water	01/13/2015

1. VOCs, SVOCs, explosives, metals, anions
2. VOCs

OVERVIEW

The samples were assessed based on the criteria specified in the *Final Appendix B Quality Assurance Project Plan Update Long-Term Monitoring Plan for the Former Joliet Army Ammunition Plant, Will County, Illinois* (MWH, May 2015) (QAPP), the DoD Quality Systems Manual Version 5.0 (July 2013), and USEPA Contract Laboratory Program National Functional Guidelines in conjunction with the internal laboratory quality control (QC) criteria. Quality checks evaluated included holding times, sample preservation, cooler temperatures, daily tune requirements, internal standards, surrogates, laboratory control samples (LCS), method blanks, trip blank, matrix spike/matrix spike duplicate (MS/MSD) analysis, initial and continuing calibration verifications and blanks (ICV, CCV, ICB, CCB), and QC Method Reporting Limit (QC/MRL) recovery. Level III data review was completed in accordance with the QAPP.

SUMMARY

This section summarizes the data evaluation findings of the laboratory analytical data package. The tables below present the quality control check requirements, the analytes that failed the criteria, analysis flags, and the data to which the validation flags are applied. Each of the quality checks reviewed in the laboratory analytical data package are summarized under each method subheading.

EPA SW-846 Method 8260B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Tuning Requirements

Instrument tuning requirements were met and within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The percent relative standard deviations (%RSD) were less than or equal to 15% for each individual compound and less than or equal to 30% for calibration check compounds (CCC).

In cases where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990, which meets quality control requirements.

The average response factors (RRF) for all system performance check compounds (SPCC) were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The initial calibration verification (ICV) percent differences (%Ds) were within quality control requirements of less than or equal to 20% for each individual compound.

Continuing Calibration

The project QAPP requires the continuing calibration verification (CCV) to be run every ten samples. However, the CCV was run every twelve hours or less, which is consistent with the method, DoD QSM, and USEPA National Functional Guidelines.

The %Ds for the CCCs and the continuing calibration response factors for the SPCCs were within quality control limits. The %Ds for all compounds were within the quality control requirements of less than or equal to 20%.

Blanks

The method blank met quality control requirements of no contamination greater than one-half the reporting limit.

Trip blank results were non-detect for all compounds.

Surrogate Spikes

Surrogate percent recoveries (%R) were within quality control requirements with the exception that 1,2-dichloroethane-d4 and dibromofluoromethane were recovered above the upper control limit in sample JP-M13-GWMW808. All compounds were nondetect in this sample; therefore, no data were qualified.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits.

Internal Standards

The internal standard areas and retention times were within quality control limits.

Quality Control/Method Reporting Limit Check

The quality control/method reporting limit check (QC/MRL) is required to be performed quarterly at a minimum in accordance with the DoD QSM. The QC/MRL was not reported for this method; however, the quarterly check may not be required at this time. The data are not affected.

EPA SW-846 Method 8270D

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Tuning Requirements

Instrument tuning requirements were met and within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The %RSDs were less than or equal to 15% for each individual compound and less than or equal to 30% for CCCs.

In cases where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r2) were greater than or equal to 0.990.

The RRFs for all SPCCs were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Ds were within quality control requirements of less than or equal to 20% for each individual compound.

Continuing Calibration

The project QAPP requires the continuing calibration verification (CCV) to be run every ten samples. However, the CCV was run every twelve hours or less, which is consistent with the method, DoD QSM, and USEPA National Functional Guidelines.

The %Ds for all compounds were within the quality control requirements of less than or equal to 20%.

The continuing calibration response factors for SPCCs were within quality control limits.

The %Ds for the CCCs met the quality control requirements.

Blanks

The method blank met quality control requirements of no contamination greater than one-half the reporting limit. Bis(2-ethylhexyl)phthalate was detected at less than one-half the reporting limit. Bis(2-ethylhexyl)phthalate was not detected in any associated samples; therefore no data were qualified.

Surrogate Spikes

Surrogate %Rs were within quality control requirements with the following exception:

- The %R for terphenyl-d14 in sample JP-M13-GWMW808 was less than the lower control limit. None of the associated compounds were detected in this sample; therefore, all associated compounds were qualified with a "UJ" flag.

- Surrogate	%R	Acceptance Limits	Associated Compound	Associated Samples	Flag
terphenyl-d14	42%	50%-134%	acenaphthene acenaphthylene anthracene benzidine benzo(a)anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(g,h,i)perylene benzo(k)fluoranthene chrysene fluoranthene fluorene indeno(1,2,3-cd)pyrene naphthalene phenanthrene pyrene	JP-M13-GWMW808	UJ (all nondetects)

Sample JP-M13-GWMW808 was re-extracted and reanalyzed outside of holding times, with similar results to the original analysis, confirming matrix interference. The original set of results should be reported.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits with the following exception:

- The %R for benzidine in the LCS was less than the lower control limit. The laboratory has indicated that benzidine is a known poor performer. Since benzidine was not detected in the associated samples, data were qualified with a "UJ" flag.

QC Sample	Compound	%R	Associated Samples	Flag
LCS 280-257681/2-A	benzidine	20%	JP-M11-GWMW803 JP-M11-GWMW333 JP-M11-GWMW334 JP-M13-GWMW808 JP-M13-GWMW809	UJ (all nondetects)

Internal Standards

The internal standard areas and retention times were within quality control limits.

Quality Control/Method Reporting Limit Check

The QC/MRL is required to be performed quarterly at a minimum in accordance with the DoD QSM. The QC/MRL was not reported for this method; however, the quarterly check may not be required at this time. The data are not affected.

EPA SW-846 Method 8330B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The %RSDs were within quality control requirements for both columns.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Ds were within quality control requirements on both columns.

Continuing Calibration

The CCV %Ds for all compounds were within the quality control requirements of less than or equal to 15% on both columns.

Blanks

Method blank analysis met quality control requirements of no detected contamination greater than one-half the reporting limit.

Surrogate Spikes

Surrogate %Rs were within quality control requirements.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits with the following exception:

- The %R for tetryl was less than the lower control limit. The laboratory has stated that the recovery for tetryl was within the laboratory's historical limits and therefore re-extraction and/or reanalysis was not performed. Tetryl was not detected in the associated samples; therefore, tetryl was qualified with a "UJ" flag.

QC Sample	Compound	%R	Associated Sample	Flag
LCS 280-257614/2-A	tetryl	32%	JP-M11-GWMW803 JP-M11-GWMW333 JP-M11-GWMW334 JP-M13-GWMW808 JP-M13-GWMW809	UJ (all nondetects)

Sample Analysis

Sample analysis met method requirements for secondary column confirmation and dilutions. The retention times were within the quality control requirements. The RPDs between the primary and secondary columns were within the quality control limit of less than or equal to 40% in samples.

EPA SW-846 Method 6010C

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibrations were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements with the following exceptions:

- Antimony was detected in a CCB at a concentration less than one-half the reporting limit. Antimony was not detected in the associated sample; therefore, no data were qualified.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPDs were within quality control requirements.

Laboratory Control Sample

The %Rs for the LCS were within quality control requirements.

CRQL Check Standard

The CRQL check standard met quality control requirements.

The serial dilution was not calculable for most metals (Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Mn, Na, Ni, Pb, Sb, Se, Tl, V, and Zn). The reported calculated %D was within quality control requirements for Mg. The post digestion spike analysis was performed. The post digestion spike was within quality control requirements

Interelement Check Standard

The interference check standard (ICSA) met quality control requirements with the exception that cadmium, chromium, copper, and manganese were detected at a level greater than the LOD for analytical batch 280-258935. The case narrative indicates that the laboratory believes the solution contains trace impurities of these elements and that the results are not due to matrix interference. The results are consistent with those found by the manufacturer of the solution. The associated sample results were not qualified.

EPA SW-846 Method 7470A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration %Rs were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample

The %R for the LCS was within quality control requirements.

EPA SW-846 Method 9056A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration met quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met quality control requirements of no detected contamination greater than one-half the reporting limit. Sulfate was detected in a CCB at a concentration less than one-half the reporting limit. The associated sample had a concentration of sulfate that was more than ten times the concentration in the CCB; therefore, no data were qualified.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %Rs for the LCS and LCSD were within quality control requirements. The RPDs were within quality control requirements.

Quality Control/Method Reporting Limit Check

The MRL results met quality control requirements.

All other acceptance criteria were met for the general chemistry data as reported.

Summary

Based on the data validation presented herein, and the QC requirements as specified in the project QAPP and guidance documents, data is considered usable as qualified and noted above.

Data Quality Evaluation of Analytical Data for Environmental Remediation Services

Contract No. W9124J-14-P-0142
Site-Wide Long-Term Groundwater Monitoring at Joliet Army Ammunition Plant, Wilmington, Illinois

INTRODUCTION

This Data Quality Evaluation Report presents the assessment and verification of analytical data collected from groundwater sampling conducted for site-wide long-term monitoring at the Joliet Army Ammunition Plant (JOAAP) in Wilmington, Illinois. The data evaluation was completed on the groundwater analytical data generated from samples collected on December 15 and 16, 2014 and received by the laboratory on December 17, 2014. The samples were analyzed by TestAmerica Laboratories, Inc., located in Arvada, Colorado. Results have been reported in laboratory report number 280-63684-1.

Groundwater samples were analyzed for volatile organic compounds (VOCs) using *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) Method 8260B, semivolatile organic compounds (SVOCs) using SW-846 Method 8270D, explosives using SW-846 Method 8330B, metals using SW-846 Method 6010C, mercury using SW-846 Method 7470A, and anions (nitrate as N and sulfate) using SW-846 Method 9056A**.** Table 1 presents a cross reference of the sample information to the laboratory analytical data package.

Table 1 - Groundwater Samples

Sample ID	Date Sampled	Time Sampled	Lab Sample ID	Analysis	Matrix	Report Date
JP-M6-GWMW117	12/15/2014	1552	280-63684-1	1	water	1/16/2015
JP-OA-GWMW118	12/15/2014	1555	280-63684-2	1	water	1/16/2015
JP-M13-GWMW806	12/16/2014	1006	280-63684-3	1	water	1/16/2015
JP-M13-GWMW808	12/16/2014	1005	280-63684-4	1	water	1/16/2015
JP-TRIPBLANK-12-16-14	12/16/2014	0800	280-63684-5	2	water	1/16/2015
JP-M13-GWMW126R	12/16/2014	1215	280-63684-6	1	water	1/16/2015
JP-M13-GWMW362	12/16/2014	1225	280-63684-7	1	water	1/16/2015
JP-M13-GWMW995	12/16/2014	1200	280-63684-8	1	water	1/16/2015
JP-M13-GWMW811	12/16/2014	1040	280-63684-9	1	water	1/16/2015

1. VOCs, SVOCs, explosives, metals, anions
2. VOCs

OVERVIEW

The samples were assessed based on the criteria specified in the *Final Appendix B Quality Assurance Project Plan Update Long-Term Monitoring Plan for the Former Joliet Army Ammunition Plant, Will County, Illinois* (MWH, May 2015) (QAPP), the DoD Quality Systems Manual Version 5.0 (July 2013), and USEPA Contract Laboratory Program National Functional Guidelines in conjunction with the internal laboratory quality control (QC) criteria. Quality checks evaluated included holding times, sample preservation, cooler temperatures, daily tune requirements, internal standards, surrogates, laboratory control samples (LCS), method blanks, trip blank, matrix spike/matrix spike duplicate

(MS/MSD) analysis, initial and continuing calibration verifications and blanks (ICV, CCV, ICB, CCB), and QC Method Reporting Limit (QC/MRL) recovery. Level III data review was completed in accordance with the QAPP. A Level IV data review was completed on approximately ten percent of the samples for the entire December 2014 sampling event. A Level IV data review includes a complete reconstruction of the analytical results.

SUMMARY

This section summarizes the data evaluation findings of the laboratory analytical data package. The tables below present the quality control check requirements, the analytes that failed the criteria, analysis flags, and the data to which the validation flags are applied. Each of the quality checks reviewed in the laboratory analytical data package are summarized under each method subheading.

EPA SW-846 Method 8260B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Tuning Requirements

Instrument tuning requirements were met and within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The percent relative standard deviations (%RSD) were less than or equal to 15% for each individual compound and less than or equal to 30% for calibration check compounds (CCC).

In cases where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990, which meets quality control requirements.

The average response factors (RRF) for all system performance check compounds (SPCC) were within quality control requirements.

The RRF and RSD were calculated for each of the seven concentrations and were acceptable. The initial calibration data for several VOCs were verified.

Second Source Calibration Verification (Initial Calibration Verification)

The initial calibration verification (ICV) percent differences (%Ds) were within quality control requirements of less than or equal to 20% for each individual compound.

Continuing Calibration

The project QAPP requires the continuing calibration verification (CCV) to be run every ten samples. However, the CCV was run every twelve hours or less, which is consistent with the method, DoD QSM, and USEPA National Functional Guidelines.

The %Ds for the CCCs and the continuing calibration response factors for the SPCCs were within quality control limits. The %Ds for all compounds were within the quality control requirements of less than or equal to 20%.

The CCV RFs and %D for several VOCs were verified. The CCV recalculations were reviewed and were acceptable.

Blanks

The method blank met quality control requirements of no contamination greater than one-half the reporting limit.

Trip blank results were non-detect for all compounds.

Surrogate Spikes

Surrogate percent recoveries (%R) were within quality control requirements. Surrogate recoveries were recalculated for samples and were acceptable.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements with the exception that the %R for 1,1-dichloropropene was greater than the upper control limit in the MSD. This compound was not detected in the parent sample; therefore, data were not qualified. The RPDs were within quality control requirements. Several VOCs were recalculated and were acceptable.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits. Several VOCs were recalculated and were acceptable.

Internal Standards

The internal standard areas and retention times were within quality control limits.

Quality Control/Method Reporting Limit Check

The quality control/method reporting limit check (QC/MRL) is required to be performed quarterly at a minimum in accordance with the DoD QSM. The QC/MRL was not reported for this method; however, the quarterly check may not be required at this time. The data are not affected.

Sample Results Verification

Approximately 10% of the VOC sample results for the December 2014 sampling event were verified through recalculation of results. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

EPA SW-846 Method 8270D

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Tuning Requirements

Instrument tuning requirements were met and within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The %RSDs were less than or equal to 15% for each individual compound and less than or equal to 30% for CCCs.

In cases where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r2) were greater than or equal to 0.990.

The RRFs for all SPCCs were within quality control requirements.

The RRF and RSD were calculated for each of the eight concentrations and were acceptable. The initial calibration data for several SVOCs were verified.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Ds were within quality control requirements of less than or equal to 20% for each individual compound.

Continuing Calibration

The project QAPP requires the continuing calibration verification (CCV) to be run every ten samples. However, the CCV was run every twelve hours or less, which is consistent with the method, DoD QSM, and USEPA National Functional Guidelines.

The %Ds for all compounds were within the quality control requirements of less than or equal to 20%.

The continuing calibration response factors for SPCCs were within quality control limits.

The %Ds for the CCCs met the quality control requirements.

The CCV RFs and %Ds for several SVOCs were verified. The CCV recalculations were reviewed and were acceptable.

Blanks

The method blank met quality control requirements of no contamination greater than one-half the reporting limit. Bis(2-ethylhexyl)phthalate was detected in the method blank at a concentration less than one-half the reporting limit. This compound was not detected in any of the associated samples; therefore, no data were qualified.

Surrogate Spikes

Surrogate %Rs were within quality control requirements. Surrogate recoveries were recalculated for several samples and were acceptable.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPDs were within quality control requirements. Several SVOCs were recalculated and were acceptable.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits. Several SVOCs were recalculated and were acceptable.

Internal Standards

The internal standard areas and retention times were within quality control limits.

Quality Control/Method Reporting Limit Check

The QC/MRL is required to be performed quarterly at a minimum in accordance with the DoD QSM. The QC/MRL was not reported for this method; however, the quarterly check may not be required at this time. The data are not affected.

Sample Results Verification

Approximately 10% of the SVOC sample results for the December 2014 sampling event were verified through recalculation of results. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

EPA SW-846 Method 8330B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The %RSDs were within quality control requirements for both columns. The initial calibration recalculations were reviewed and were acceptable.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Ds were within quality control requirements on both columns.

Continuing Calibration

The CCV %Ds for all compounds were within the quality control requirements of less than or equal to 15% on both columns. The CCV RFs and %Ds for the explosive compounds were recalculated and verified and were acceptable.

Blanks

Method blank analysis met quality control requirements of no detected contamination greater than one-half the reporting limit with the exception that 2-amino-4,6-dinitrotoluene was detected in the method blank at a concentration greater than the reporting limit on the confirmation column. The primary column result was non-detect; therefore, the method blank is considered non-detect for this compound. No associated sample results were qualified.

Surrogate Spikes

Surrogate %Rs were within quality control requirements, with the following exceptions:

- The %R for surrogate 1,2-dinitrobenzene in sample JP-M13-GWMW362 was greater than the upper quality control limit on the primary column. Compounds that were detected were qualified with a “J” flag.

- The %R for surrogate 1,2-dinitrobenzene in sample JP-M13-GWMW995 was greater than the upper quality control limit on the primary column. Compounds that were detected were qualified with a "J" flag.

Surrogate	%R	Acceptance Limits	Associated Compound	Associated Samples	Flag
1,2-dinitrobenzene	496%	83%-119%	2,4-dinitrotoluene 2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene 4-amino-2,6-dinitrotoluene	JP-M13-GWMW362	J for detects
1,2-dinitrobenzene	471%	83%-119%	2,4-dinitrotoluene 2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene 4-amino-2,6-dinitrotoluene	JP-M13-GWMW995	J for detects

Surrogate recoveries were recalculated and were acceptable.

<u>Matrix Spike/Matrix Spike Duplicate</u>

The %Rs for the MS and MSD samples were within quality control requirements with the following exception:

- The %Rs for tetryl in the MS and MSD were less than the lower control limit. Tetryl was not detected in the parent sample and was qualified with a "UJ" flag.

The RPDs were within quality control requirements, with the exception that the RPD for tetryl was greater than the control limit.

QC Sample	Compound	%R	Associated Sample	Flag
JP-M13-GWMW126RMS/MSD	tetryl	58%/65%	JP-M13-GWMW126R	UJ

The explosive compounds were recalculated and were acceptable.

<u>Laboratory Control Sample</u>

The %Rs for the LCS were within quality control limits with the following exception:

- The %R for tetryl was less than the lower control limit in the LCS. The laboratory has stated that the recovery for tetryl was within the laboratory's historical limits and therefore re-extraction and/or reanalysis was not performed. Tetryl was not detected in any of the associated samples; therefore, results were qualified with a "UJ" flag for the non-detects. The RPDs were within quality control requirements.

QC Sample	Compound	%R	Associated Sample	Flag
LCS 280-257614/2-A	tetryl	32%	JP-M6-GWMW117 JP-OA-GWMW118 JP-M13-GWMW806 JP-M13-GWMW807 JP-M13-GWMW126R JP-M13-GWMW362 JP-M13-GWMW995 JP-M13-GWMW811	UJ (all non-detects)

The explosive compounds were recalculated and were acceptable.

Sample Analysis

Sample analysis met method requirements for secondary column confirmation and dilutions. The retention times were within the quality control requirements. The RPDs between the primary and secondary columns were within the quality control limit of less than or equal to 40% in samples.

Sample Results Verification

Approximately 10% of the explosives sample results for the December 2014 sampling event were verified through recalculation of results. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

EPA SW-846 Method 6010C

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibrations were within quality control requirements. Recalculations of the correlation coefficients for metals were acceptable.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements. Recalculations of the CCV for metals were acceptable.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements with the following exceptions:

- Arsenic was detected in the method blank at a concentration less than one-half the reporting limit. The associated samples were either non-detect for arsenic or had a concentration of arsenic that was less than ten times the concentration in the method blank. The samples with detections of arsenic were qualified with a “B” to denote the contamination.
- Selenium was detected in the method blank at a concentration less than one-half the reporting limit. Selenium was detected in sample JP-M13-GWMW806 at a concentration comparable to that in the method blank. Selenium was qualified with a “B” flag in this sample.
- Sodium was detected in a CCB at a concentration less than one-half the reporting limit. The associated samples had a concentration of sodium that was three orders of magnitude greater than in the CCB; therefore, sodium was not qualified.

- Magnesium was detected in a CCB at a concentration less than one-half the reporting limit. The associated samples had a concentration of magnesium that was four orders of magnitude greater than in the CCB; therefore, magnesium was not qualified.
- Selenium was detected in a CCB at a concentration less than one-half the reporting limit. The associated samples were either non-detect for selenium or have already been qualified with a "B" flag as noted for the method blank contamination.

Compound	QC Sample	Concentration	Associated Samples	Concentration	Flag
Arsenic	method blank	0.00535 J mg/L	JP-M13-GWMW807 JP-M13-GWMW362 JP-M13-GWMW811	0.012 J mg/L 0.0076 J mg/L 0.0082 J mg/L	B B B
Selenium	method blank	0.0107 J mg/L	JP-M13-GWMW806	0.0073 J mg/L	B

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements with the following exception:

- The %R for sodium in the MS and MSD was greater than the upper control limit. Sodium in the parent sample exceeded four times the spiking amount. Consequently, sodium was not qualified in the sample.

The RPDs were within quality control requirements. MS recovery results for metals analyses were verified through recalculations and were acceptable.

Laboratory Control Sample

The %Rs for the LCS were within quality control requirements. LCS recalculations for metals were acceptable.

CRQL Check Standard

The CRQL check standard met quality control requirements.

The serial dilution was not calculable for most metals. The reported calculated %Ds were within quality control requirements for calcium and magnesium. The post digestion spike analysis was performed.

The post digestion spike was within quality control requirements with the exception that magnesium was recovered below the lower control limit. Magnesium was qualified as "J" for sample JP-M13-GWMW126R.

QC Sample	Compound	%R	Associated Sample	Flag
Post Digestion Spike	Magnesium	67%	JP-M13-GWMW126R	J

Interelement Check Standard

The interference check standard (ICSA) met quality control requirements with the exception that cadmium, chromium , copper, and manganese were detected at a level greater than the LOD for prep batch 280-257879. The case narrative indicates that the laboratory believes the solution contains trace impurities of these elements and that the results are not due to matrix interference. The results are consistent with those found by the manufacturer of the solution. The associated sample results were not qualified.

Sample Results Verification

Approximately 10% of the metals sample results for the December 2014 sampling event were verified. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

EPA SW-846 Method 7470A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration %Rs were within quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements. Recalculations of the CCV for mercury were acceptable.

Blanks

The initial, method, and continuing calibration blanks met method quality control requirements.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPD was within quality control requirements. The MS recovery result for mercury was verified through recalculation and was acceptable.

Laboratory Control Sample

The %R for the LCS was within quality control requirements.

Sample Results Verification

Approximately 10% of the mercury sample results for the December 2014 sampling event were verified. Sample calculations were performed to verify the results reported by the laboratory were accurate. The recalculations verified that sample results were acceptable as reported.

EPA SW-846 Method 9056A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration met quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %Rs were within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met quality control requirements of no detected contamination greater than one-half the reporting limit. Sulfate was detected in a CCB at a concentration less than one-half the reporting limit. The associated sample had a concentration of sulfate two orders of magnitude greater than the concentration in the CCB. No data were qualified.

Matrix Spike/Matrix Spike Duplicate

The %Rs for the MS and MSD samples were within quality control requirements. The RPDs were within quality control requirements. MS/MSD recovery results were verified through recalculations and were acceptable.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %Rs for the LCS and LCSD were within quality control requirements. The RPDs were within quality control requirements. Recalculation of the LCS was acceptable.

Quality Control/Method Reporting Limit Check

The MRL results met quality control requirements.

All other acceptance criteria were met for the general chemistry data as reported.

Sample Results Verification

Approximately 10% of the anion sample results for the December 2014 sampling event were verified. Raw data was reviewed to verify the results reported by the laboratory were accurate. The raw data verified that sample results were acceptable as reported.

Summary

Based on the data validation presented herein, and the QC requirements as specified in the project QAPP and guidance documents, data is considered usable as qualified and noted above.

Data Quality Evaluation of Analytical Data for Environmental Remediation Services

Contract No. W9124J-14-P-0142
Site-Wide Long-Term Groundwater Monitoring at Joliet Army Ammunition Plant, Wilmington, Illinois

INTRODUCTION

This Data Quality Evaluation Report presents the assessment and verification of analytical data collected from groundwater sampling conducted for site-wide long-term monitoring at the Joliet Army Ammunition Plant (JOAAP) in Wilmington, Illinois. The data evaluation was completed on the groundwater analytical data generated from samples collected on December 16 through December 18, 2014 and received by the laboratory on December 19, 2014. The samples were analyzed by TestAmerica Laboratories, Inc., located in Arvada, Colorado. Results have been reported in laboratory report number 280-63820-1.

Groundwater samples were analyzed for explosives using *Test Methods for Evaluating Solid Waste Physical/Chemical Methods* (SW-846) Method 8330B and sulfate using SW-846 Method 9056A. Table 1 presents a cross reference of the sample information to the laboratory analytical data package.

Table 1 - Groundwater Samples

Sample ID	Date Sampled	Time Sampled	Lab Sample ID	Analysis	Matrix	Report Date
JP-M8-GWMW330	12/16/2014	1532	280-63820-1	1	water	1/16/2015
JP-OA-GWMW119	12/17/2014	1013	280-63820-2	2	water	1/16/2015
JP-M6-GWMW162R	12/17/2014	1140	280-63820-3	2	water	1/16/2015
JP-M6-GWMW123R	12/17/2014	1130	280-63820-4	2	water	1/16/2015
JP-M6-GWMW212R	12/18/2014	0945	280-63820-5	2	water	1/16/2015
JP-M7-GWMW124R	12/17/2014	1353	280-63820-6	2	water	1/16/2015
JP-M6-GWMW318	12/17/2014	1454	280-63820-7	2	water	1/16/2015
JP-M6-GWMW319	12/17/2014	1457	280-63820-8	2	water	1/16/2015
JP-M6-GWMW994	12/18/2014	0800	280-63820-9	2	water	1/16/2015
JP-M6-GWMW652	12/18/2014	1035	280-63820-10	2	water	1/16/2015
JP-M6-GWMW654	12/18/2014	1145	280-63820-11	2	water	1/16/2015
JP-M6-GWMW313	12/18/2014	1140	280-63820-12	2	water	1/16/2015

Sample Analysis
1. Sulfate
2. Explosives

OVERVIEW

The samples were assessed based on the criteria specified in the *Final Appendix B Quality Assurance Project Plan Update Long-Term Monitoring Plan for the Former Joliet Army Ammunition Plant, Will County, Illinois* (MWH, May

2015) (QAPP), the DoD Quality Systems Manual Version 5.0 (July 2013), and USEPA Contract Laboratory Program National Functional Guidelines in conjunction with the internal laboratory quality control (QC) criteria. Quality checks evaluated included holding times, sample preservation, cooler temperatures, surrogates, laboratory control samples (LCS), method blanks, matrix spike/matrix spike duplicate (MS/MSD) analysis, initial and continuing calibration verifications and blanks (ICV, CCV, ICB, CCB), and QC Method Reporting Limit (QC/MRL) recovery. Level III data review was completed in accordance with the QAPP.

SUMMARY

This section summarizes the data evaluation findings of the laboratory analytical data package. The tables below present the quality control check requirements, the analytes that failed the criteria, analysis flags, and the data to which the validation flags are applied. Each of the quality checks reviewed in the laboratory analytical data package are summarized under each method subheading.

EPA SW-846 Method 8330B

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration requirements were met. The percent relative standard deviations (%RSD) were within quality control requirements for both columns.

Second Source Calibration Verification (Initial Calibration Verification)

The initial calibration verification (ICV) percent differences (%Ds) were within quality control requirements on both columns.

Continuing Calibration

The continuing calibration verification (CCV) %Ds for all compounds were within the quality control requirements of less than or equal to 15% on both columns.

Blanks

Method blank analysis met quality control requirements of no detected contamination greater than one-half the reporting limit on the primary column. RDX was detected in the method blank at less than one-half the reporting limit. RDX was not detected in the associated samples; no data were qualified. The compound 2-amino-4,6-dinitrotoluene was detected in the method blank at more than one-half the reporting limit on the confirmation column. The primary column result was nondetect; therefore, the method blank is considered nondetect for 2-amino-4,6-dinitrotoluene. However, the laboratory re-extracted and reanalyzed samples outside of holding time. The original sample results should be reported.

Surrogate Spikes

Surrogate percent recoveries (%Rs) were within quality control requirements with the following exceptions:

- The %R for surrogate 1,2-dinitrobenzene in sample JP-M6-GWMW162R was greater than the upper quality control limit on the primary column. No compounds were detected in this sample; therefore, no data were qualified.

- The %R for surrogate 1,2-dinitrobenzene in sample JP-M6-GWMW212R and JP-M6-GWMW212RDL was greater than the upper quality control limit on the primary column. Compounds that were detected were qualified with a “J” flag.
- The %R for surrogate 1,2-dinitrobenzene in sample JP-M6-GWMW318 was greater than the upper quality control limit on the primary column. Compounds that were detected were qualified with a “J” flag.
- The %R for surrogate 1,2-dinitrobenzene in sample JP-M6-GWMW319 was greater than the upper quality control limit on the primary column. No compounds were detected; therefore, no data were qualified. The %R for surrogate 1,2-dinitrobenzene was less than the lower control limit on the secondary column. No compounds were detected; therefore, these compounds were qualified with a “UJ” flag.
- The %R for surrogate 1,2-dinitrobenzene in sample JP-M6-GWMW994 was greater than the upper quality control limit on the primary column. Compounds that were detected were qualified with a “J” flag. Several compounds were out of calibration range and the sample was diluted 2000X. The %R for surrogate 1,2-dinitrobenzene was diluted out. Results were not qualified for this.
- The %R for surrogate 1,2-dinitrobenzene in sample JP-M6-GWMW652 was greater than the upper quality control limit on the primary column. Compounds that were detected were qualified with a “J” flag. Several compounds were out of calibration range and the sample was diluted 2000X. The %R for surrogate 1,2-dinitrobenzene was diluted out. Results were not qualified for this.

Surrogate	%R	Acceptance Limits	Associated Compound	Associated Samples	Flag
1,2-dinitrobenzene 1,2-dinitrobenzene	6298% 6817%	83%-119% 83%-119%	1,3,5-trinitrobenzene 1,3-dinitrobenzene 2,4,6-trinitrotoluene 2,4-dinitrotoluene 2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene 2-nitrotoluene 3-nitrotoluene 4-nitrotoluene nitrobenzene	JP-M6-GWMW212R/DL	J for detects
1,2-dinitrobenzene	1883%	83%-119%	2,6-dinitrotoluene 1,3-dinitrobenzene	JP-M6-GWMW318	J for detects
1,2-dinitrobenzene	65%	83%-119%	1,3-dinitrobenzene HMX nitrobenzene RDX	JP-M6-GWMW319	UJ for nondetects
1,2-dinitrobenzene	4130%	83%-119%	1,3,5-trinitrobenzene 1,3-dinitrobenzene 2-amino-4,6-dinitrotoluene nitrobenzene	JP-M6-GWMW994	J for detects
1,2-dinitrobenzene	1885%	83%-119%	1,3-dinitrobenzene 4-amino-2,6-dinitrotoluene nitrobenzene	JP-M6-GWMW652	J for detects

Matrix Spikes/Matrix Spike Duplicates

The %Rs for the matrix spike (MS) and matrix spike duplicate (MSD) samples were within quality control requirements with the following exceptions:

- For the MS/MSD pair associated with parent sample JP-M6-GWMW212R, the %R for several compounds was outside the control limits for one or both of the MS and MSD. For the %Rs greater than the upper control limit, the detected compounds were qualified with a "J" flag in the parent sample and the nondetected compounds were not qualified. For the %Rs less than the lower control limit, the detected compounds were qualified with a "J" flag in the parent sample and the nondetected compounds were qualified with a "UJ" flag. Several compounds (2,4,6-trinitrotoluene; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; 2-nitrotoluene; 3-nitrotoluene; and 4-nitrotoluene) were recovered outside control limits but the sample results were more than four times the spiking amount. Consequently, these compounds were not qualified.
- For the MS/MSD pair associated with parent sample JP-M6-GWMW652, the %R for several compounds was outside the control limits for one or both of the MS and MSD. For the %Rs greater than the upper control limit, the detected compounds were qualified with a "J" flag in the parent sample and the nondetected compounds were not qualified. For the %Rs less than the lower control limit, the detected compounds were qualified with a "J" flag in the parent sample and the nondetected compounds were qualified with a "UJ" flag. Several compounds (2,4,6-trinitrotoluene; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 2-amino-4,6-dinitrotoluene; 2-nitrotoluene; 3-nitrotoluene; 4-amino-2,6-dinitrotoluene; 4-nitrotoluene; and nitrobenzene) were recovered outside control limits but the sample results were more than four times the spiking amount. Consequently, these compounds were not qualified.

QC Sample	Compound	%R	Associated Sample	Flag
JP-M6-GWMW212R MS/MSD	1,3,5-trinitrobenzene 1,3-dinitrobenzene 4-amino-2,6-dinitrotoluene nitrobenzene	-77%/123% 68%/96% 0%/0% 46%/85%	JP-M6-GWMW212R	J J UJ J
JP-M6-GWMW652 MS/MSD	RDX tetryl	0%/0% 0%/0%	JP-M6-GWMW652	UJ UJ

Several RPDs were outside quality control requirements.

Laboratory Control Sample

The %Rs for the LCS were within quality control limits with the following exception:

- The %R for tetryl was less than the lower control limit in LCS 280-258313/2-A. The associated sample results were nondetect for tetryl and were qualified with a "UJ" flag. The associated samples were re-prepared and/or reanalized outside holding time. The %R for tetryl in the reanalyzed LCS was also less than the lower control limit. The original results should be reported.

QC Sample	Compound	%R	Associated Sample	Flag
LCS 280-258313/2-A	tetryl	12%	JP-OA-GWMW119 JP-M6-GWMW162R JP-M6-GWMW123R JP-M6-GWMW212R JP-M7-GWMW124R JP-M6-GWMW318 JP-M6-GWMW319 JP-M6-GWMW994 JP-M6-GWMW652 JP-M6-GWMW654 JP-M6-GWMW313	UJ (all non-detects)

Sample Analysis

Sample analysis met method requirements for secondary column confirmation and dilutions, with the following exceptions:

- The %RPD between the primary and confirmation columns exceeded 40% for 1,3,5-trinitrobenzene; nitrobenzene; and 2-amino-4,6-dinitrotoluene in sample JP-M6-GWMW212R. The chromatograms for sample JP-M6-GWMW212R indicate interference for both columns for 1,3,5-trinitrobenzene; nitrobenzene; and 2-amino-4,6-dinitrotoluene; consequently, the lower concentration has been reported. These compounds were qualified with a "J" flag.

- The %RPD between the primary and confirmation columns exceeded 40% for 1,3-dinitrobenzene and 2,6-dinitrotoluene in sample JP-M6-GWMW318. The chromatograms for sample JP-M6-GWMW318 indicate interference for both columns for 1,3-dinitrobenzene and 2,6-dinitrotoluene; consequently, the lower concentration has been reported. These compounds were qualified with a "J" flag.

- The %RPD between the primary and confirmation columns exceeded 40% for 1,3,5-trinitrobenzene and 2-amino-4,6-dinitrotoluene in sample JP-M6-GWMW994. The chromatograms for sample JP-M6-GWMW994 indicate interference for both columns for 1,3,5-trinitrobenzene and 2-amino-4,6-dinitrotoluene; consequently, the lower concentration has been reported. These compounds were qualified with a "J" flag.

- The %RPD between the primary and confirmation columns exceeded 40% for 4-amino-2,6-dinitrotoluene in sample JP-M6-GWMW652 and 2-amino-4,6-dinitrotoluene in sample JP-M6-GWMW652DL. The chromatograms for sample JP-M6-GWMW652 indicate interference for both columns for 4-amino-2,6-dinitrotoluene; the chromatograms for sample JP-M6-GWMW652DL indicate interference for both columns for 2-amino-4,6-dinitrotoluene. Consequently, the lower concentrations have been reported. These compounds were qualified with a "J" flag.

- The %RPD between the primary and confirmation columns exceeded 40% for 2-amino-4,6-dinitrotoluene in sample JP-M6-GWMW654. The chromatograms for sample JP-M6-GWMW654 indicate interference for both columns for 2-amino-4,6-dinitrotoluene; consequently, the lower concentration has been reported. This compound was qualified with a "J" flag.

Date	Compound	%RPD	Associated Samples	Flag
01/05/2015	1,3,5-trinitrobenzene	67.7%	JP-M6-GWMW212R	J
	nitrobenzene	48.0%		J
	2-amino-4,6-dinitrotoluene	100.2%		J
01/06/2015	1,3-dinitrobenzene	112.7%	JP-M6-GWMW318	J
	2,6-dinitrotoluene	60.2%		J
01/06/2015	1,3,5-trinitrobenzene	92.1%	JP-M6-GWMW994	J
	2-amino-4,6-dinitrotoluene	91.2%		J
01/06/2015	4-amino-2,6-dinitrotoluene	77.8%	JP-M6-GWMW652	J
	2-amino-4,6-dinitrotoluene	64.5%	JP-M6-GWMW652DL	J
01/06/2015	2-amino-4,6-dinitrotoluene	107.7%	JP-M6-GWMW654	J

- The compounds 2,4,6-trinitrotoluene; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 2-nitrotoluene; 3-nitrotoluene; and 4-nitrotoluene were out of calibration range in Sample JP-M6-GWMW212R. This sample was analyzed at a 2000X dilution. These compounds should be reported from this dilution.

- The compounds 2,4,6-trinitrotoluene; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 2-nitrotoluene; 3-nitrotoluene; and 4-nitrotoluene were out of calibration range in sample JP-M6-GWMW994. This sample was analyzed at a 2000X dilution. These compounds should be reported from this dilution.

- The compounds 2,4,6-trinitrotoluene; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 2-nitrotoluene; 3-nitrotoluene; and 4-nitrotoluene were out of calibration range in sample JP-M6-GWMW652. This sample was analyzed at a 200X dilution. These compounds should be reported from this dilution.

EPA SW-846 Method 9056A

Holding Time/Sample Preservation

Holding time requirements were met and cooler temperatures were within quality control requirements.

Initial Calibration

Initial calibration met quality control requirements.

Second Source Calibration Verification (Initial Calibration Verification)

The ICV %R was within quality control requirements.

Continuing Calibration

Continuing calibration %Rs were within quality control requirements.

Blanks

The initial, method, and continuing calibration blanks met quality control requirements of no detected contamination greater than one-half the reporting limit. Sulfate was detected in an ICB and a CCB at a concentration less than one-half the reporting limit. The associated sample had a concentration of sulfate three orders of magnitude greater than the concentration in the ICB or CCB. No data were qualified.

Matrix Spike/Matrix Spike Duplicate

An MS/MSD pair was not analyzed with the sample data. The data are not affected.

Laboratory Control Sample/Laboratory Control Sample Duplicate

The %Rs for the LCS and LCSD were within quality control requirements. The RPD was within quality control requirements.

Quality Control/Method Reporting Limit Check

The MRL results met quality control requirements.

All other acceptance criteria were met for the general chemistry data as reported.

Summary

Based on the data validation presented herein, and the QC requirements as specified in the project QAPP and guidance documents, data is considered usable as qualified and noted above.

C2 - DATA USABILITY REPORT

Former Joliet Army Ammunition Plant
Will County, Illinois

Appendix C2
Data Usability Report
Groundwater and Surface Water Sampling – November and December 2014

Long-Term Monitoring for Multiple Groundwater Sites

Prepared For:
U.S. Army Environmental Command

Firm Fixed Price Contract
W9124J-14-P-0142

DATA USABILITY REPORT

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CRS/BTZ
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ACRONYMS AND ABBREVIATIONS

%D	percent difference
%R	percent recovery
CCB	continuing calibration blank
CCV	continuing calibration verification
GC/MS	gas chromatography/mass spectroscopy
ICAL	initial calibration
ICB	initial calibration blank
ICS	interference check sample
ICV	initial calibration verification
J	estimated value
JOAAP	Joliet Army Ammunition Plant
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
MD	matrix duplicate (metals)
MRL	method reporting limit
MS/MSD	matrix spike/matrix spike duplicate
MWH	MWH Americas, Inc.
ORP	oxidation/reduction potential
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
R	analytical result is unusable
RPD	relative percent difference
SDG	sample delivery group
SVOCs	semivolatile organic compounds
TAL	target analyte list
Test America	Test America Laboratories, Inc.
U	analyte analyzed for but not detected
UJ	analyte is not detected estimated quantitation limit
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds

APPENDIX C2

DATA USABILITY REPORT

1.0 INTRODUCTION

The following data usability summary discusses quality assurance/quality control (QA/QC) outliers for each analyte group per sampling round and summarizes the Data Evaluation Reports presented in Appendix C1. Data qualifiers were added to results and imported into the Joliet Army Ammunition Plant (JOAAP) database. Data qualifiers used in the validation process may include the following:

- U – Not detected. This validation qualifier was added if there was blank contamination and the sample concentration was less than five times the blank concentration (ten times for common organic contaminants methylene chloride, acetone, and phthalates)
- B – Detected. Analyte also detected in a blank.
- J – Estimated value. This validation qualifier was added if the reported concentration is estimated.
- UJ – Not detected, estimated quantitation limit. This validation qualifier was added if the analyte was not detected and QA/QC parameters were not met.
- R – Unusable data. This validation qualifier was added if the QA/QC parameters were not met and were extremely low (i.e. less than 10% recovery for laboratory control samples (LCS) or surrogate recoveries)

Test America Laboratories, Inc. (Test America) located at 4955 Yarrow Street, Arvada, Colorado performed the analyses of groundwater and surface water samples collected in November and December 2014 at the JOAAP located in Wilmington, Illinois. Groundwater was collected from site M13 Landfill and analyzed for the following parameters in November 2014:

- VOCs were analyzed by SW846 Method 8260B
- SVOCs were analyzed by SW846 Method 8270D
- Explosives were analyzed by SW846 Method 8330B
- TAL metals were analyzed by SW846 Methods 6010C and 7470A
- Sulfate was analyzed by USEPA Method 9056A
- Nitrate was analyzed by USEPA Method 9056A

Groundwater was collected from eleven 11 sites (L1, L2, L3/L3 Landfill, L14 and MFG Sites M1, M6, M7 (MW124R as part of M6 monitoring well network), M8, M11, M13, and Other Areas) and analyzed for the following parameters in December 2014:

- VOCs were analyzed by SW846 Method 8260B at Sites M11 and M13 Landfills.
- SVOCs were analyzed by SW846 Method 8270D at Sites M11 and M13 Landfills.

- Explosives were analyzed by SW846 Method 8330B at Sites L1, L2, L3, L14, OA, M1, M6, M7, M8, M11 Landfill, and M13 Landfill.
- TAL metals were analyzed by SW846 Methods 6010C and 7470A at Sites L3 Landfill, M11 Landfill, and M13 Landfill.
- Sulfate was analyzed by USEPA Method 9056A at Sites M1, MFG Site M8 (MW330), M11 Landfill, and M13 Landfill.
- Nitrate was analyzed by USEPA Method 9056A at Sites M11 Landfill, and M13 Landfill.

Surface water was collected from three sites at JOAAP and analyzed for the following parameters:

- Explosives were analyzed by SW846 Method 8330B at Sites L1, L2, and L3/L3 Landfill.
- TAL metals were analyzed by SW846 Methods 6010C and 7470A at Site L3 Landfill.
- Sulfate was analyzed by USEPA Method 9056A at Site M1.

Field parameters are not discussed in this data usability report, but were recorded by field personnel with a water quality meter at the time of sample collection and included:

- pH, temperature, specific conductivity, dissolved oxygen, turbidity, and oxidation/reduction potential (ORP)

The following summarizes the sample delivery group (SDG) and corresponding data quality evaluation report:

Sample Delivery Group	Data Validation Report	Associated Samples
280-62703-1	JOAAP Data Quality Evaluation Report - November 2014 Report 1 of 2	JP-M13-GWMW809 JP-M13-GWMW808 TRIPBLANK- 111814
280-62756-1	JOAAP Data Quality Evaluation Report - November 2014 Report 2 of 2	JP-M13-GWMW807 JP-M13-GWMW806 JP-M13-GWMW811 JP-M13-GWMW126R JP-M13-GWMW999 JP-M13-GWMW362 TRIP BLANK- 111914

Sample Delivery Group	Data Validation Report	Associated Samples
280-63477-1	JOAAP Data Quality Evaluation Report - December 2014 Report 1 of 6	JP-M1-GWMW641 JP-M1-GWMW642 JP-M1-GWMW644 JP-M1-GWMW643 JP-M1-GWMW999 JP-M1-SW709 JP-M1-GWMW648 JP-M1-GWMW231 JP-M1-GWMW649 JP-M1-GWMW108 JP-M1-GWMW640 JP-M1-GWMW646 JP-M1-GWMW645 JP-L14-GWMW511 JP-L14-GWH7 JP-L14-GWMW512 JP-L1-GWMW173 JP-L1-GWWES3 JP-L1-SW550
280-63514-1	JOAAP Data Quality Evaluation Report - December 2014 Report 2 of 6	JP-L1-GWWES1 JP-L1-GWMW174 JP-L1-GWMW131 JP-L3-GWMW410 JP-L3-GWMW998 JP-L3-GWMW631 JP-L3-GWMW630 JP-L3-GWMW997 JP-L3-GWMW412 JP-L3-SW557 JP-L3-SW558 JP-L3-SW777 JP-L3-GWMW633
280-63551-1	JOAAP Data Quality Evaluation Report - December 2014 Report 3 of 6	JP-L2-GWMW621 JP-L2-GWMW620 JP-L2-GWMW404 JP-L2-SW555 JP-M11-GWMW336 JP-M11-GWMW802 JP-M11-GWMW804 JP-M11-GWMW805 JP-M11-GWMW996 JP-M11-GWMW335 TRIP BLANK- 12-11-14

Sample Delivery Group	Data Validation Report	Associated Samples
280-63638-1	JOAAP Data Quality Evaluation Report - December 2014 Report 4 of 6	JP-M11-GWMW803 JP-M11-GWMW333 JP-M11-GWMW334 JP-M13-GWMW808 JP-M13-GWMW809 JP-TRIPBLANK- 12-15-14
280-63684-1	JOAAP Data Quality Evaluation Report - December 2014 Report 5 of 6	JP-M6-GWMW117 JP-OA-GWMW118 JP-M13-GWMW806 JP-M13-GWMW808 JP-TRIPBLANK-12-16-14 JP-M13-GWMW126R JP-M13-GWMW362 JP-M13-GWMW995 JP-M13-GWMW811
280-63820-1	JOAAP Data Quality Evaluation Report - December 2014 Report 6 of 6	JP-M8-GWMW330 JP-OA-GWMW119 JP-M6-GWMW162R JP-M6-GWMW123R JP-M6-GWMW212R JP-M7-GWMW124R JP-M6-GWMW318 JP-M6-GWMW319 JP-M6-GWMW994 JP-M6-GWMW652 JP-M6-GWMW654 JP-M6-GWMW313

2.0 LABORATORY QA/QC ELEMENTS

MWH Americas, Inc. (MWH) performed the equivalent of USEPA Level III validation on 100% of the data and Level IV on 10% of the data using the JOAAP Final Quality Assurance Project Plan (QAPP) Update (MWH, May 2015) for Long Term Monitoring, a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, and the Department of Defense Quality Systems Manual for Environmental Laboratories validation guidelines, as appropriate. QAPP Worksheets #34, #35, and #36 describe the verification process and QAPP Worksheet #37 describes the data usability assessment.

Data were evaluated for precision, accuracy, representativeness, comparability, and completeness based on results of the following QA/QC samples and parameters, where applicable:

- Sample preservation
- Sample holding times
- Surrogate spikes (organics)
- Laboratory control sample (LCS/LCSD)
- Matrix spike/matrix spike duplicate (MS/MSD)
- Matrix duplicate (MD) for metals
- Laboratory duplicate samples
- Gas chromatography/mass spectroscopy (GC/MS) tunes (organics)
- Internal standards (organics)
- Initial calibration (ICAL) standards
- Initial calibration verification (ICV) standards
- Continuing calibration verification (CCV) standards
- Interference check samples (ICSs) (metals)
- Trip blanks (VOCs)
- Serial dilution (metals)
- Method blanks
- Initial calibration blanks (ICBs)
- Continuing calibration blanks (CCBs)
- Post digestion spikes (metals)

The following field QA/QC samples were collected and analyzed:

- One field duplicate per 10 field samples collected
- One MS/MSD (extra sample volume) per 20 field samples collected
- Trip blanks included with each cooler containing VOC samples

Samples were stored in coolers on wet ice, picked-up from JOAAP by Test America and transported to their University Park, Illinois lab, then shipped to the analytical laboratory in Arvada (Denver), Colorado under chain-of-custody documentation.

3.0 EVALUATION OF MEASUREMENT QUALITY OBJECTIVES

For each analytical method, laboratory QA/QC results were compared to the established acceptance limits. Refer to the associated Data Quality Evaluation Reports presented in Appendix C1 for analysis of the below criteria for each individual SDG and associated samples. The parameters reviewed by method within each Data Quality Evaluation Report for each SDG each are outlined as follows.

Precision was quantitatively evaluated by reviewing the relative percent differences (RPDs) for the following QA/QC samples:

- MS/MSDs
- Matrix duplicate (metals)
- LCS/LCSDs
- Laboratory duplicate samples
- Serial dilution (metals)
- Field duplicate samples
- Primary and secondary column confirmation (explosives)

Accuracy was quantitatively evaluated by comparing the percent recovery (%R) or percent difference (%D) for the following QA/QC samples or parameters:

- Surrogate spikes (VOCs and SVOCs)
- Internal standards (VOCs and SVOCs)
- ICVs
- CCVs
- MS/MSDs
- LCSs
- ICSs (metals)
- Post digestion spike (metals)

Refer to Worksheet #12 (Method Performance Criteria Table) and Worksheet #28 (QC Samples Table) for QC samples analyzed and criteria limits.

Representativeness was evaluated through a review of the following QA/QC elements:

- Sample preservation
- Sample holding times
- Compliance with sample collection, handling, and analysis methods specified in the Work Plan

Refer to QAPP Worksheets # 21 through # 27 for evaluation criteria related to representativeness.

Comparability was qualitatively evaluated through a review of the following QA/QC elements:

- Sample collection and handling procedures
- Sample preparation, analysis, and quantitation procedures
- Units of measure

Refer to QAPP Worksheets # 21 through # 27 for evaluation criteria related to comparability. Comparability was acceptable for the November and December 2014 sampling events.

No samples were rejected as a result of not meeting one or more of the above criteria as presented in the Data Quality Evaluation Reports in Appendix C1.

3.1 COMPLETENESS

Completeness was calculated by dividing the number of acceptable sample results by the total number of scheduled sample results. All scheduled and planned samples were collected and analyzed. The completeness goal for holding times was 100%. Completeness goals for holding times were met for all analytes in the November and December 2014 sampling round.

The laboratory completeness goal for the number of acceptable sample results compared to the total sample results is 100%. Only results qualified "R" as unusable were considered unacceptable sample results for calculating laboratory completeness. Sample results qualified "J" as estimated, "U" as not detected, or "UJ" as not detected estimated quantitation limit were considered quantitative and acceptable.

No analytes were qualified "R" as unusable for the November and December 2014 sampling round. Completeness and usability was 100% for November and December 2014.

Refer to QAPP Worksheet #37 for the data usability criteria.

3.2 SENSITIVITY

Sensitivity was evaluated by comparing method reporting limits (MRLs) with appropriate criteria. In samples not requiring dilutions, adequate sensitivity was demonstrated with MRLs equal to or less than the associated criteria. Refer to QAPP Worksheet #15 the Reference Limits and Evaluation Table for compound specific MRLs, method detection limits, and project action limits.

3.3 TRACEABILITY

Traceability was evaluated by reviewing field documentation, chain-of-custody documentation, and analytical reports. Each sample was found to be traceable from collection through analysis.

3.4 DATA QUALIFIERS

Refer to Tables 3-1 through 3-5 of the 2014 Semi-annual Groundwater Monitoring Report for summaries of groundwater and surface water data. Refer to Appendix C1 for data evaluation reports associated with each SDG. Table 1 of Appendix C2 provides a summary of all qualified data.

3.5 CONCLUSIONS

As discussed in Section 3.1, completeness goals were met for the November and December 2014 analytical data. The data complies with contract requirements. The data that did not meet QA criteria and were qualified as estimated data with a "J" or "UJ" and qualified "U" or "B" due to blank contamination are considered usable and do not negatively impact the project objectives. There were no biases or trends observed in this dataset.

4.0 REFERENCES

DoD, 2013. *Quality Systems Manual for Environmental Laboratories, Final Version 5,* DoD Environmental Data Quality Workgroup. January 2006.

MWH, 2015. *Final Quality Assurance Project Plan (QAPP) Update JOAAP Environmental Remediation,* MWH America's Inc. (MWH), May 2015.

USEPA, 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods Third Edition*. November 1986.

USEPA, 2008. *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*. June 2008.

USEPA, 2010. *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review*. January 2010.

APPENDIX C2
TABLE 1

Summary of Qualified Results
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Analysis	Failed Criteria	Date	Compound	Result	Associated Samples	SDG	Flag
November 2014							
SVOCs	MS/MSD	--	benzidine	%R = 0%/0%	JP-M13-GWMW809	280-62703-1	UJ
SVOCs	LCS 280-254563/2-A	--	benzidine	%R = 22%	JP-M13-GWMW809 JP-M13-GWMW808	280-62703-1	UJ UJ
Explosives	MS/MSD	--	2-nitrotoluene tetryl	%R = 68%/72% %R = 58%/65%	JP-M13-GWMW809	280-62703-1	UJ UJ
Metals	Method Blank	--	zinc (5.86 J ug/L)	5.0 J ug/L	JP-M13-GWMW809	280-62703-1	B
SVOCs	LCS 280-254563/2-A	--	benzidine	%R = 22%	JP-M13-GWMW807 JP-M13-GWMW806 JP-M13-GWMW811 JP-M13-GWMW126R JP-M13-GWMW999 JP-M13-GWMW362	280-62756-1	UJ (all nondetects)
Explosives	Surrogate 1,2-dinitrobenzene	--	2,4-dinitrotoluene 2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene 4-amino-2,6-dinitrotoluene	%R = 498%	JP-M13-GWMW999	280-62756-1	J for detects
Explosives	Surrogate 1,2-dinitrobenzene	--	2,4-dinitrotoluene 2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene 2-nitrotoluene 4-amino-2,6-dinitrotoluene	%R = 467%	JP-M13-GWMW362	280-62756-1	J for detects
Explosives	LCS 280-254702/2-A	--	2-amino-4,6-dinitrotoluene	%R = 70%	JP-M13-GWMW807 JP-M13-GWMW806 JP-M13-GWMW811 JP-M13-GWMW126R JP-M13-GWMW999 JP-M13-GWMW362	280-62756-1	J (all detects) / UJ (all non-detects)
Metals	Method Blank	--	silver (1.23 J ug/L)	1.0 J ug/L 1.3 J ug/L 1.4 J ug/L 1.4 J ug/L 1.7 J ug/L 1.8 J ug/L	JP-M13-GWMW807 JP-M13-GWMW806 JP-M13-GWMW811 JP-M13-GWMW126R JP-M13-GWMW999 JP-M13-GWMW362	280-62703-1	B
Metals	MS/MSD JP-M13-GWMW807MS/MSD	--	Aluminum Beryllium Manganese Zinc Thallium	%R = 83%/85% %R = 86%/89% %R = 89%/94% %R = 85%/87% %R = 84%/83%	JP-M13-GWMW807	280-62703-1	UJ UJ J J UJ

APPENDIX C2
TABLE 1

Summary of Qualified Results
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Analysis	Failed Criteria	Date	Compound	Result	Associated Samples	SDG	Flag
December 2014							
Explosives	LCS 280-256855/2-A/LCSD 280-256855/3-A	--	2-amino-4,6-dinitrotoluene	%R = 72%/78%	JP-L14-GWMW511 JP-L14-GWH7 JP-L14-GWMW512 JP-L1-GWMW173 JP-L1-GWWES3 JP-L1-SW550	280-63477-1	UJ UJ J J J UJ
Explosives	Surrogate 1,2-dinitrobenzene	--	1,3dinitrobenzene 2,4,6-trinitrotoluene 2,6-dinitrotoluene 2-nitrotoluene 3-nitrotoluene 4-amino-2,6-dinitrotoluene RDX 1,3,5-trinitrobenzene 2,4-dinitrotoluene 2-amino-4,6-dinitrotoluene 4-nitrotoluene HMX nitrobenzene tetryl	%R = 0%	JP-L1-GWMW131	280-63514-1	J J UJ UJ UJ UJ UJ J UJ J UJ UJ UJ J
Explosives	LCS 280-256855/2-A/LCSD 280-256855/3-A	--	2-amino-4,6-dinitrotoluene	%R = 72%/78%	JP-L1-GWWES1 JP-L1-GWMW174 JP-L1-GWMW131 JP-L3-GWMW410 JP-L3-GWMW998 JP-L3-GWMW631 JP-L3-GWMW630 JP-L3-GWMW997 JP-L3-GWMW412 JP-L3-SW557 JP-L3-SW558 JP-L3-SW777 JP-L3-GWMW633	280-63514-1	J UJ J UJ UJ UJ UJ UJ J UJ UJ UJ UJ
Explosives	%RPD	12/14/2014	1,3,5-trinitrobenzene	67.7%	JP-L1-GWWES1	280-63514-1	J

APPENDIX C2
TABLE 1

Summary of Qualified Results
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Analysis	Failed Criteria	Date	Compound	Result	Associated Samples	SDG	Flag
Explosives	%RPD	12/14/2014	1,3,5-trinitrobenzene 1,3-dinitrobenzene tetryl 2-amino-4,6-dinitrotoluene	55.9% 70.7% 198.4% 164.1%	JP-L1-GWMW131	280-63514-1	J
Metals	Method Blank	--	silver (1.16 J ug/L)	1.1 J ug/L 1.2 J ug/L 1.4 J ug/L 1.1 J ug/L 0.96 J ug/L 1.7 J ug/L 0.96 J ug/L 1.5 J ug/L	JP-L3GWMW998 JP-L3-GWMW631 JP-L3-GWMW997 JP-L3-GWMW412 JP-L3-SW557 JP-L3-SW558 JP-L3-SW777 JP-L3-GWMW633	280-63514-1	B
SVOCs	Method Blank	--	dimethylphthalate (0.624 J ug/L)	0.32 J ug/L 0.21 J ug/L 0.30 J ug/L 0.25 J ug/L 0.26 J ug/L 0.21 J ug/L	JP-M11-GWMW336 JP-M11-GWMW802 JP-M11-GWMW804 JP-M11-GWMW805 JP-M13-GWMW996 JP-M11-GWMW335	280-63551-1	B
Explosives	LCS 280-257164/2-A/LCSD 280-257164/3-A	--	tetryl	%R = 30%/25%	JP-L2-GWMW621 JP-L2-GWMW620 JP-L2-GWMW404 JP-L2-SW555 JP-M11-GWMW336 JP-M11-GWMW802 JP-M11-GWMW804 JP-M11-GWMW805 JP-M13-GWMW996 JP-M11-GWMW335	280-63551-1	UJ (all non detects)
Explosives	%RPD	12/18/2014	4-amino-2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene	79.8% 156.4%	JP-M11-GWMW804	280-63551-1	J J
Metals	Post Digestion Spike	--	calcium manganese	74% 79%	JP-M11-GWMW336.	280-63551-1	J J

APPENDIX C2
TABLE 1

Summary of Qualified Results
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Analysis	Failed Criteria	Date	Compound	Result	Associated Samples	SDG	Flag
Nitrate	Continuing Calibration Blank	--	nitrate (0.0818 J mg/L)	0.10 J mg/L 0.092 J mg/L 0.092 J mg/L	JP-M11-GWMW336 JP-M11-GWMW802 JP-M11-GWMW804	280-63551-1	B
SVOCs	Surrogate Sample terphenyl-d14	--	acenaphthene acenaphthylene anthracene benzidine benzo(a)anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(g,h,i)perylene benzo(k)fluoranthene chrysene fluoranthene fluorene indeno(1,2,3-cd)pyrene naphthalene phenanthrene pyrene	%R = 42% (50-134%)	JP-M13-GWMW808	280-63638-1	UJ (all nondetects)
SVOCs	LCS 280-257681/2-A	--	benzidine	%R = 20%	JP-M11-GWMW803 JP-M11-GWMW333 JP-M11-GWMW334 JP-M13-GWMW808 JP-M13-GWMW809	280-63638-1	UJ (all nondetects)
Explosives	LCS 280-257614/2-A	--	tetryl	%R = 32%	JP-M11-GWMW803 JP-M11-GWMW333 JP-M11-GWMW334 JP-M13-GWMW808 JP-M13-GWMW809	280-63638-1	UJ (all nondetects)
Explosives	Surrogate Sample 1,2-dinitrobenzene	--	2,4-dinitrotoluene 2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene 4-amino-2,6-dinitrotoluene	%R = 496% (83-119%)	JP-M13-GWMW362	280-63684-1	J for detects
Explosives	Surrogate Sample 1,2-dinitrobenzene	--	2,4-dinitrotoluene 2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene 4-amino-2,6-dinitrotoluene	%R = 471% (83-119%)	JP-M13-GWMW995	280-63684-1	J for detects
Explosives	MS/MSD JP-M13-GWMW809MS/MSD	--	2-nitrotoluene tetryl	68%/72% 58%/65%	JP-M13-GWMW809	280-63684-1	UJ

APPENDIX C2
TABLE 1

Summary of Qualified Results
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Analysis	Failed Criteria	Date	Compound	Result	Associated Samples	SDG	Flag
Explosives	LCS 280-257614/2-A	--	tetryl	%R = 32%	JP-M6-GWMW117 JP-OA-GWMW118 JP-M13-GWMW806 JP-M13-GWMW807 JP-M13-GWMW126R JP-M13-GWMW362 JP-M13-GWMW995 JP-M13-GWMW811	280-63684-1	UJ (all nondetects)
Metals	Method Blank	--	arsenic (0.00535 J mg/L)	0.012 J mg/L 0.0076 J mg/L 0.0082 J mg/L	JP-M13-GWMW807 JP-M13-GWMW362 JP-M13-GWMW811	280-63684-1	B
Metals	Method Blank	--	selenium (0.0107 J mg/L)	0.0073 J mg/L	JP-M13-GWMW806	280-63684-1	B
Metals	Post Digestion Spike	--	magnesium	67%	JP-M13-GWMW126R	280-63684-1	J
Explosives	Surrogate Sample 1,2-dinitrobenzene 1,2-dinitrobenzene	--	6298% (83%-119%) 6817% (83%-119%)	1,3,5-trinitrobenzene 1,3-dinitrobenzene 2,4,6-trinitrotoluene 2,4-dinitrotoluene 2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene 2-nitrotoluene 3-nitrotoluene 4-nitrotoluene Nitrobenzene	JP-M6-GWMW212R/DL	280-63820-1	J for detects
Explosives	Surrogate Sample 1,2-dinitrobenzene	--	1883% (83%-119%)	2,6-dinitrotoluene 1,3-dinitrobenzene	JP-M6-GWMW318	280-63820-1	J for detects
Explosives	Surrogate Sample 1,2-dinitrobenzene	--	65% (83%-119%)	1,3-dinitrobenzene HMX nitrobenzene RDX	JP-M6-GWMW319	280-63820-1	UJ for nondetects
Explosives	Surrogate Sample 1,2-dinitrobenzene	--	4130% (83%-119%)	1,3,5-trinitrobenzene 1,3-dinitrobenzene 2-amino-4,6-dinitrotoluene Nitrobenzene	JP-M6-GWMW994	280-63820-1	J for detects
Explosives	Surrogate Sample 1,2-dinitrobenzene	--	1885% (83%-119%)	1,3-dinitrobenzene 4-amino-2,6-dinitrotoluene Nitrobenzene	JP-M6-GWMW652	280-63820-1	J for detects

APPENDIX C2
TABLE 1

Summary of Qualified Results
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant
Will County, Illinois

Analysis	Failed Criteria	Date	Compound	Result	Associated Samples	SDG	Flag
Explosives	MS/MSD JP-M6-GWMW212R MS/MSD	--	-77%/123% 68%/96% 0%/0% 46%/85%	1,3,5-trinitrobenzene 1,3-dinitrobenzene 4-amino-2,6-dinitrotoluene nitrobenzene	JP-M6-GWMW212R	280-63820-1	J J UJ J
Explosives	MS/MSD JP-M6-GWMW652 MS/MSD	--	0%/0% 0%/0%	RDX tetryl	JP-M6-GWMW652	280-63820-1	UJ UJ
Explosives	LCS 280-258313/2-A	--	tetryl	%R = 12%	JP-OA-GWMW119 JP-M6-GWMW162R JP-M6-GWMW123R JP-M6-GWMW212R JP-M7-GWMW124R JP-M6-GWMW318 JP-M6-GWMW319 JP-M6-GWMW994 JP-M6-GWMW652 JP-M6-GWMW654 JP-M6-GWMW313	280-63820-1	UJ (all nondetects)
Explosives	RPD between primary and secondary columns	1/5/2015	1,3,5-trinitrobenzene nitrobenzene 2-amino-4,6-dinitrotoluene	%RPD = 67.7% %RPD = 48.0% %RPD = 100.2%	JP-M6-GWMW212R	280-63820-1	J J J
Explosives	RPD between primary and secondary columns	1/6/2015	1,3-dinitrobenzene 2,6-dinitrotoluene	%RPD = 112.7% %RPD = 60.2%	JP-M6-GWMW318	280-63820-1	J J
Explosives	RPD between primary and secondary columns	1/6/2015	1,3,5-trinitrobenzene 2-amino-4,6-dinitrotoluene	%RPD = 92.1% %RPD = 91.2%	JP-M6-GWMW994	280-63820-1	J J
Explosives	RPD between primary and secondary columns	1/6/2015	4-amino-2,6-dinitrotoluene 2-amino-4,6-dinitrotoluene	%RPD = 77.8% %RPD = 64.5%	JP-M6-GWMW652 JP-M6-GWMW652DL	280-63820-1	J J
Explosives	RPD between primary and secondary columns	1/6/2015	2-amino-4,6-dinitrotoluene	%RPD = 107.7%	JP-M6-GWMW654	280-63820-1	J

Notes:

B = analyte detected in method blank
CCV = continuing calibration verification
HMX = high melting explosive
J = estimated concentration
mg/L = miligrams per liter
MS/MSD = matrix spike / matrix spike duplicate
RDX = royal demolition explosive
RPD = relative percent difference
SDG = sample delivery group
SVOCs = semi-volatile organic compounds
tetryl = methyl-2,4,6-trinitrophenylnitramine
U = not detected
UJ = not detected, estimated detection limit
VOCs = volatile organic compounds

APPENDIX D

PHOTOGRAPHS

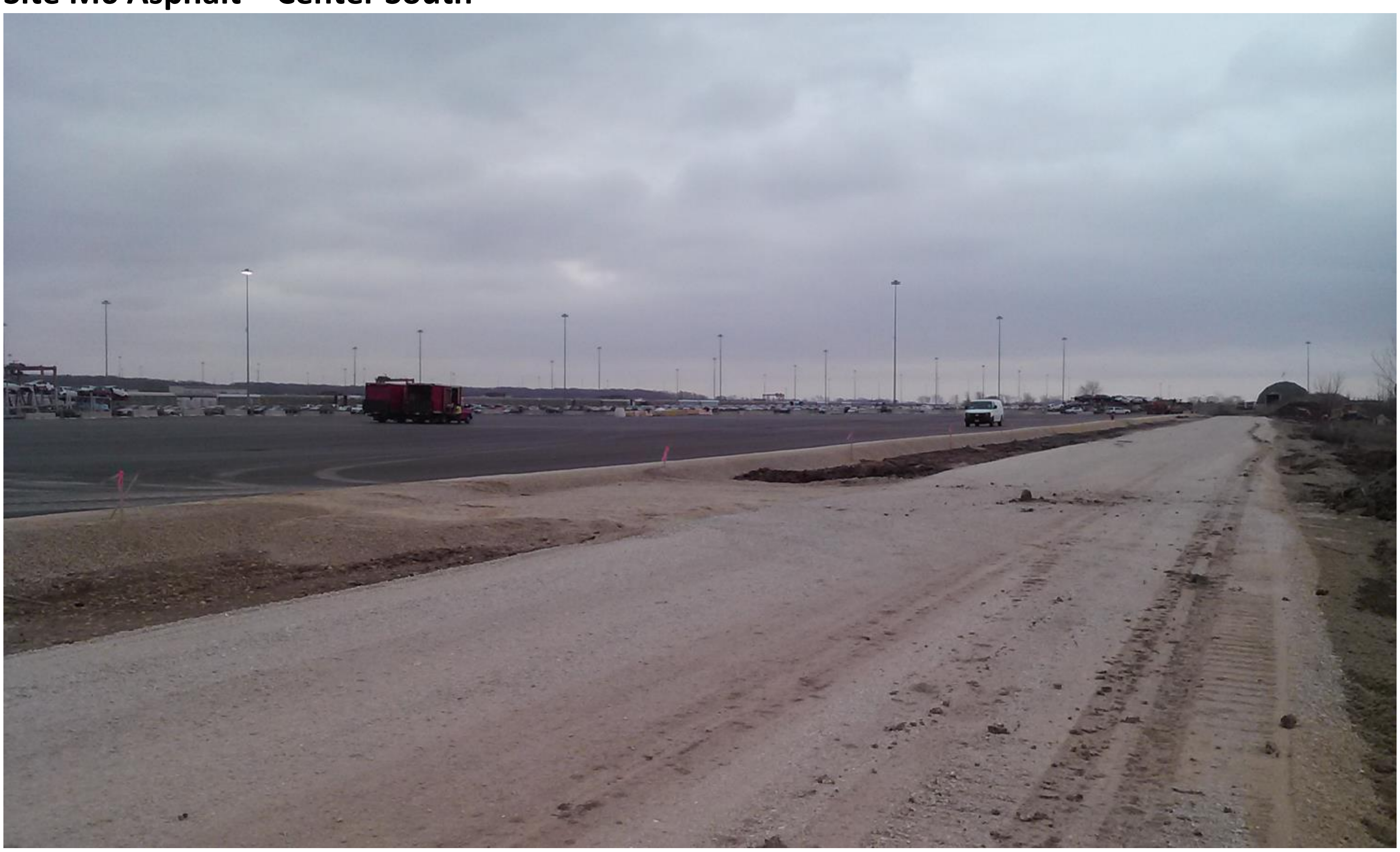
Site M6 Soil Stockpile

Site M6 Soil Stockpile


Site M6 Asphalt - North

Site M6 Asphalt – Center North

Site M6 Asphalt – Center South



Siet M6 Asphalt - South


Site M6 – Asphalt Surrounding Monitoring Well MW125R


Site M13 Wells MW126R and MW362 Asphalt and Manholes

APPENDIX E

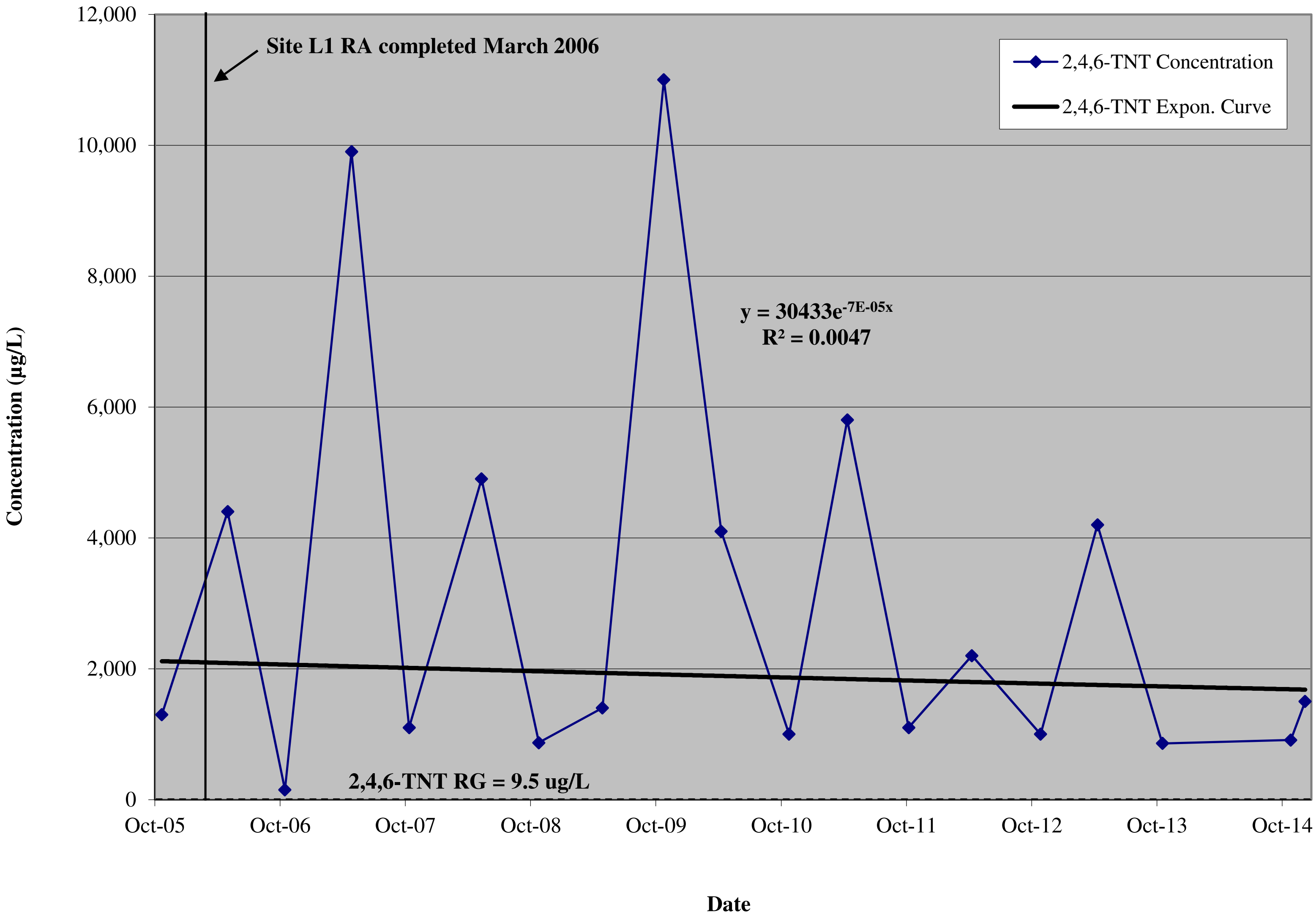
FIRST ORDER RATE DECAY TREND ANALYSIS

E1 – Trend Graphs
E2 – Estimated Clean-up Time: Example Calculation

E1 – TREND GRAPHS

Figure E-1

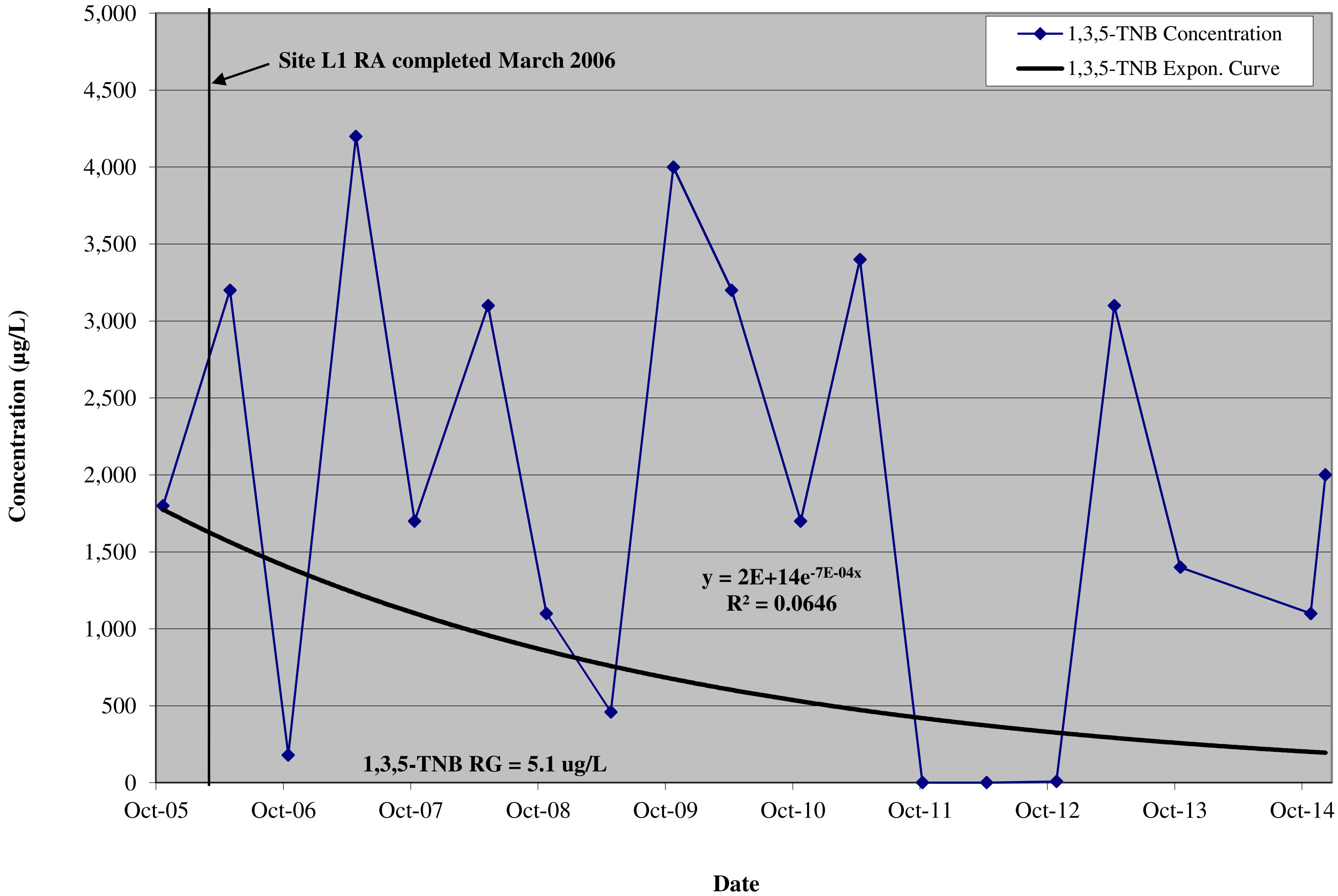
Site L1 - MW131
First Order Decay Rate Constant Estimation - 2,4,6-TNT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



RJR/rjr/CRS
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E1-2_L1 MW131 Trend Analysis.xls(MW131 2,4,6-TNT)

Figure E-2

Site L1 - MW131
First Order Decay Rate Constant Estimation - 1,3,5-TNB
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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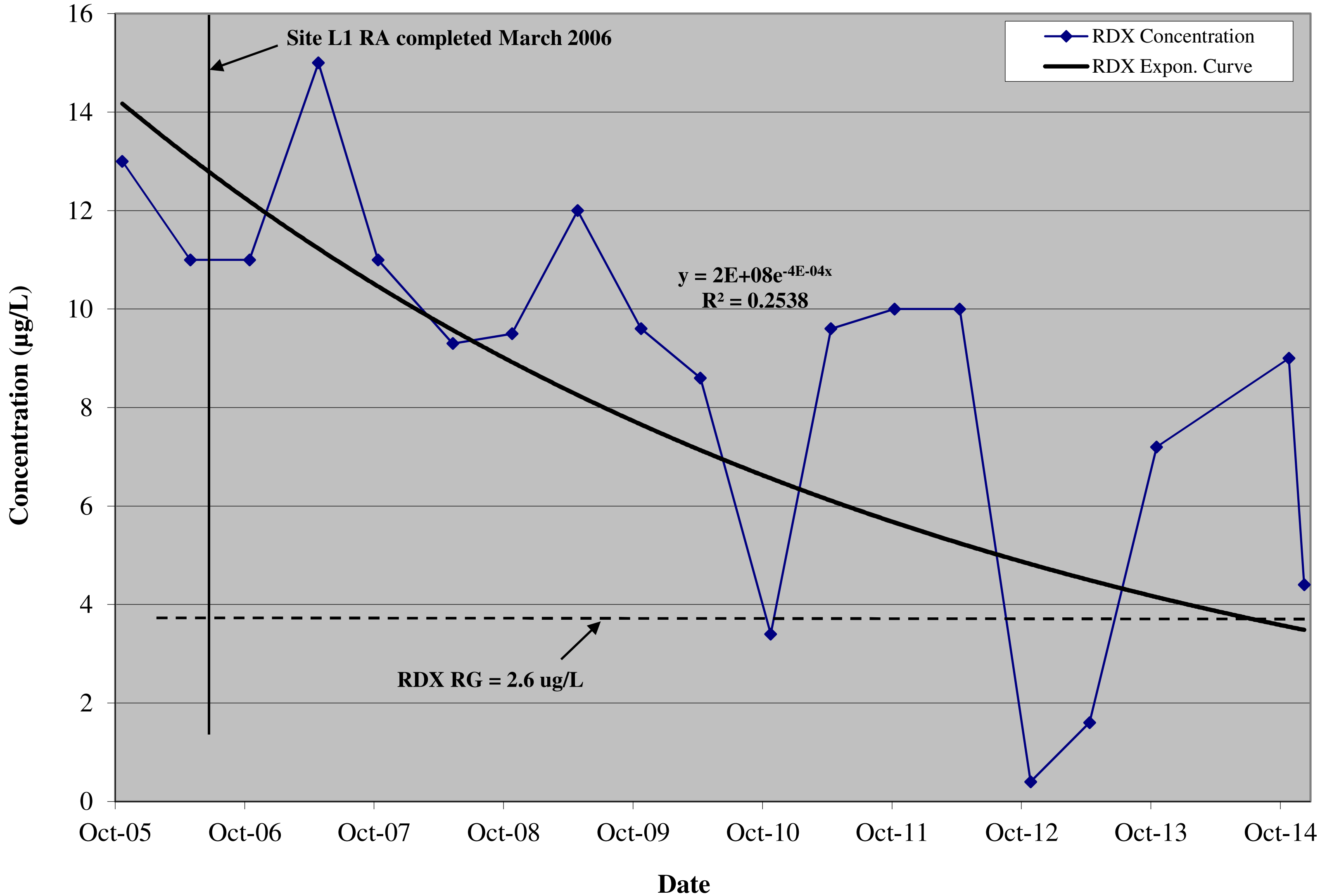
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E1-2_L1 MW131 Trend Analysis.xls(MW131 1,3,5-TNB)

Figure E-3

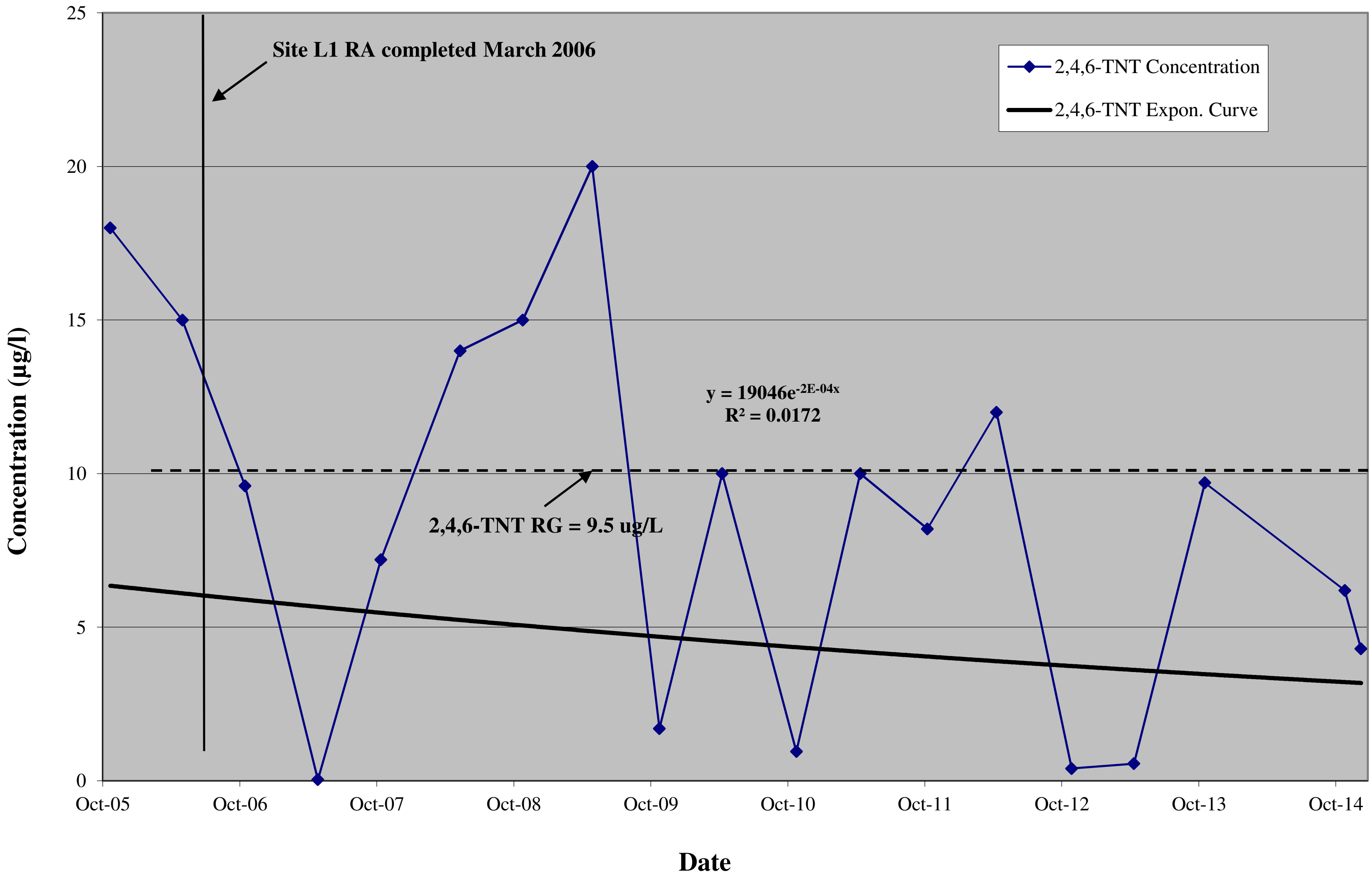
Site L1 - MW173
First Order Decay Rate Constant Estimation - RDX
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



RJR/rjr/CRS
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E3-4_L1 MW173 Trend Analysis.xls(MW173 RDX)

Figure E-4

Site L1 - MW173
First Order Decay Rate Constant Estimation - 2,4,6-TNT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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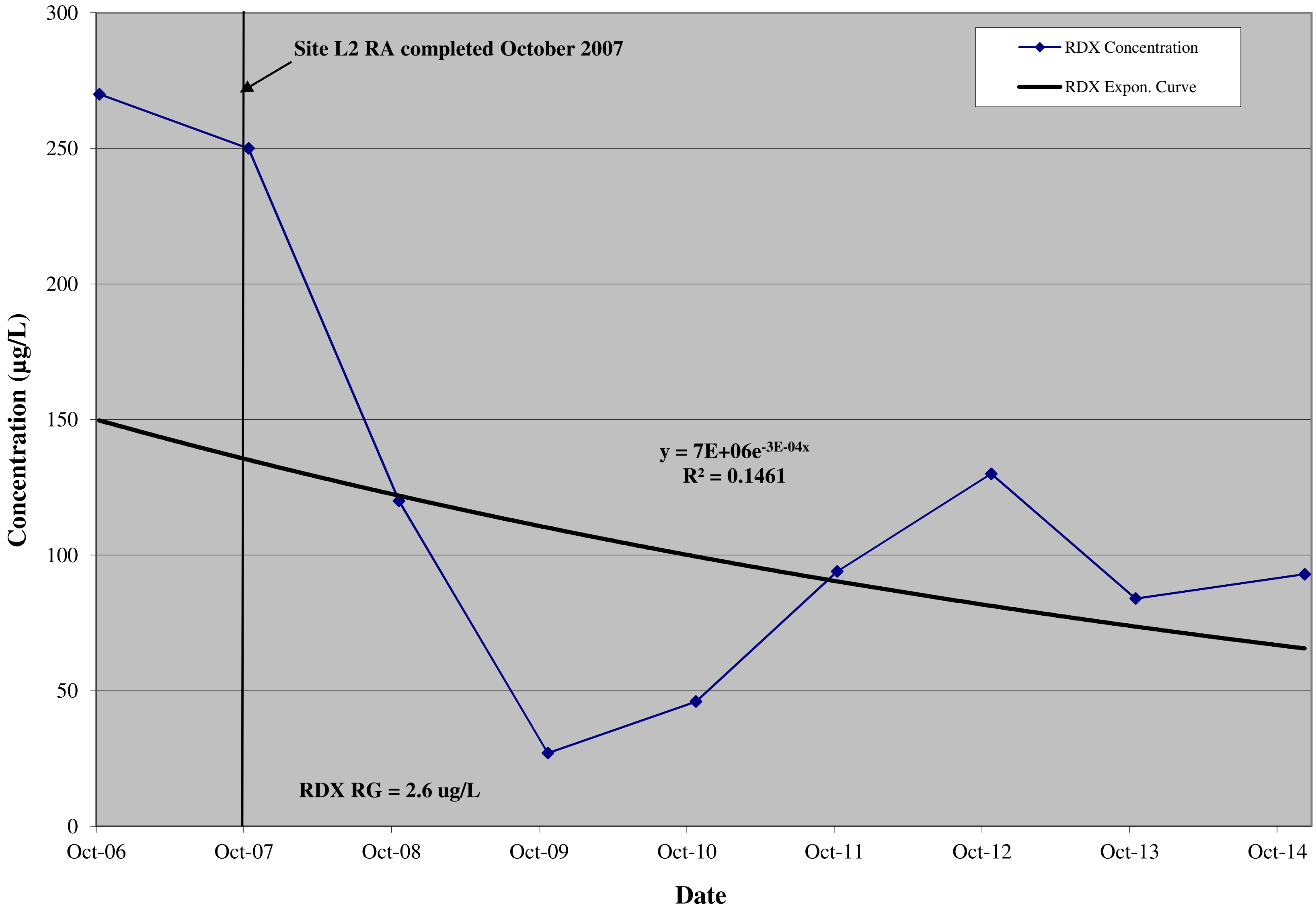
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E3-4_L1 MW173 Trend Analysis.xls(MW173 2,4,6-TNT)

Figure E-5

Site L2 - MW404
First Order Decay Rate Constant Estimation - RDX
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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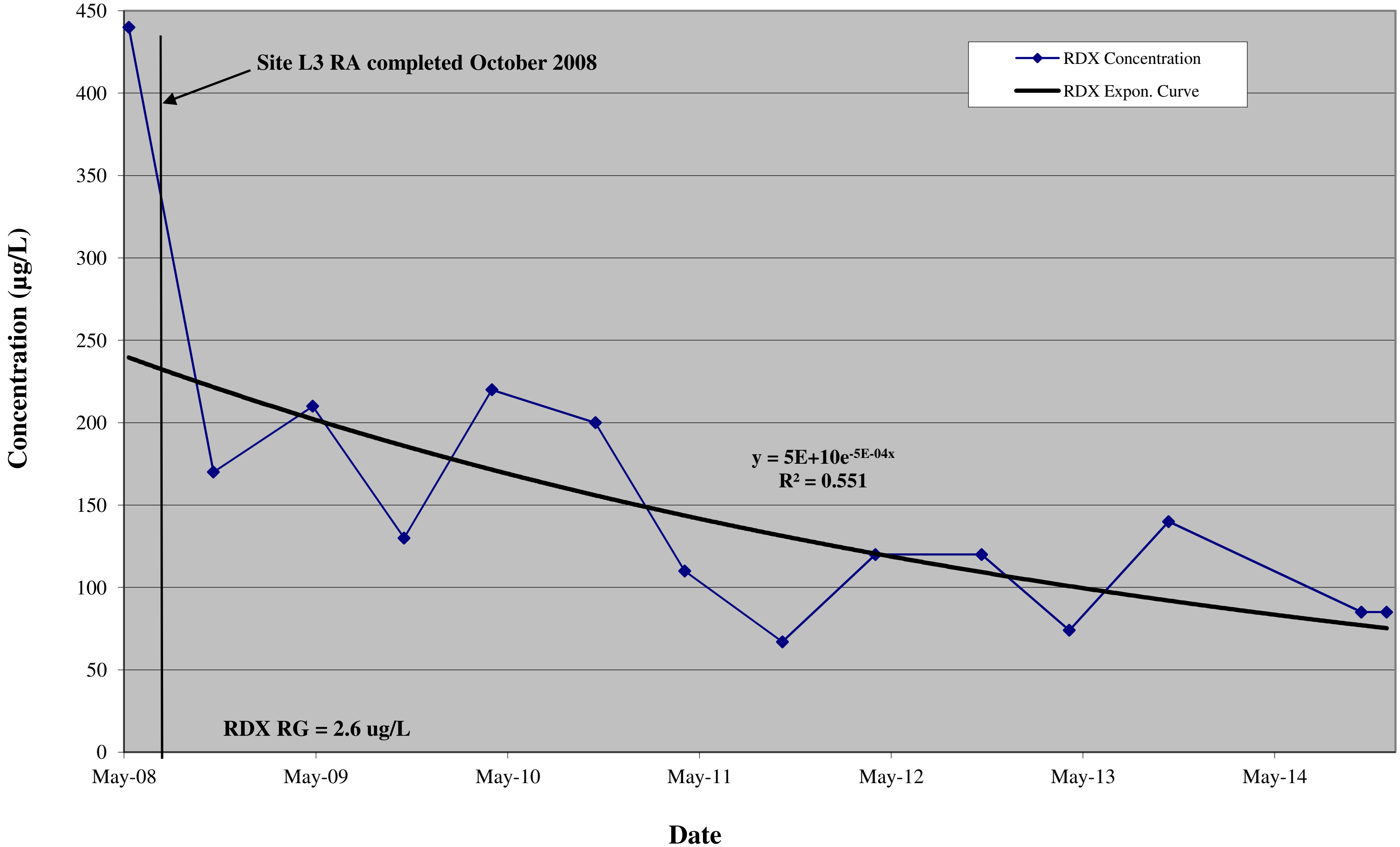
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E5_L2 MW404 Trend Analysis.xls(MW404 RDX)

Figure E-6

Site L3 - MW412
First Order Decay Rate Constant Estimation - RDX
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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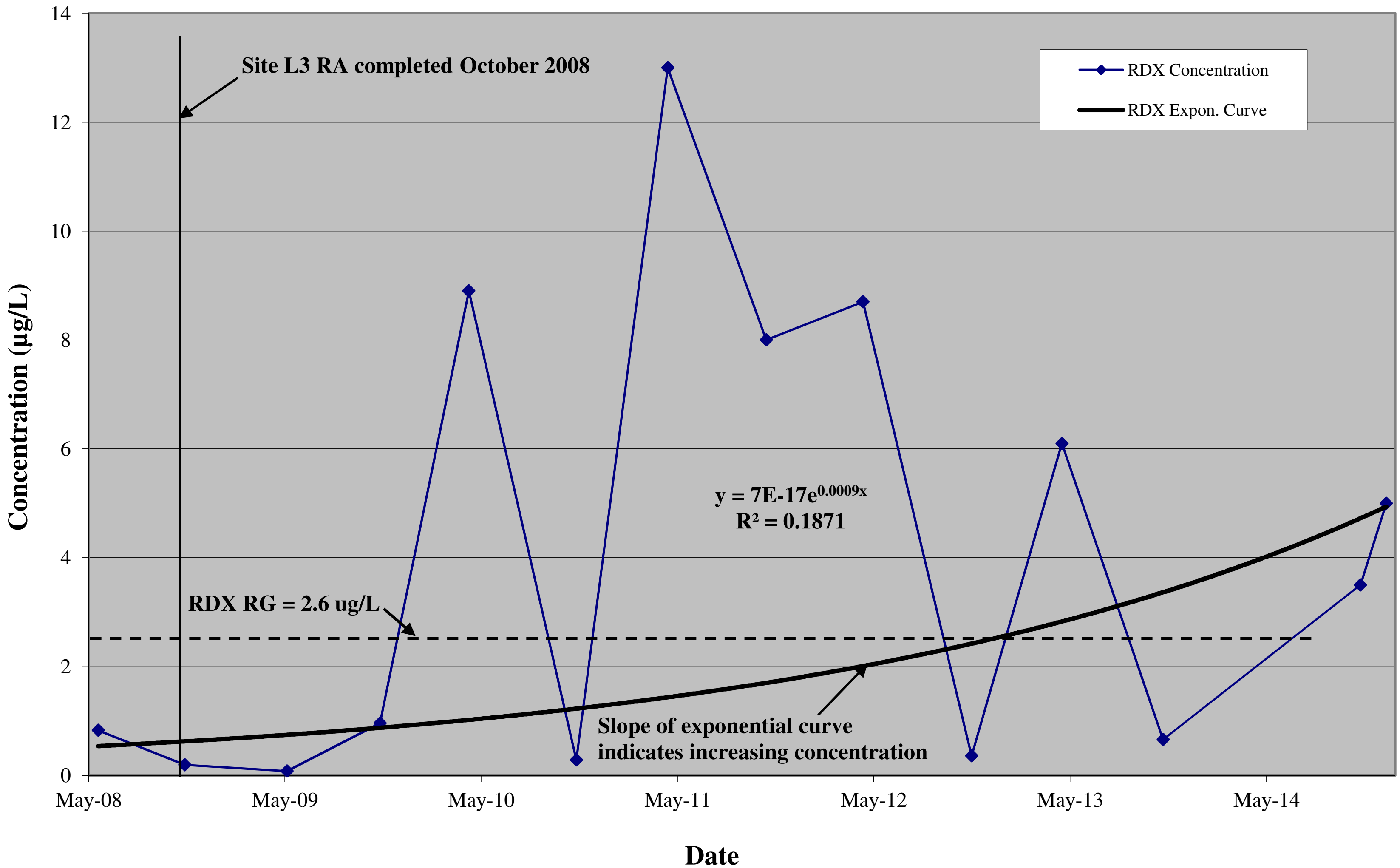
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E6_L3 MW412 Trend Analysis.xls(MW412 RDX)

Figure E-7

Site L3 - MW630
First Order Decay Rate Constant Estimation - RDX
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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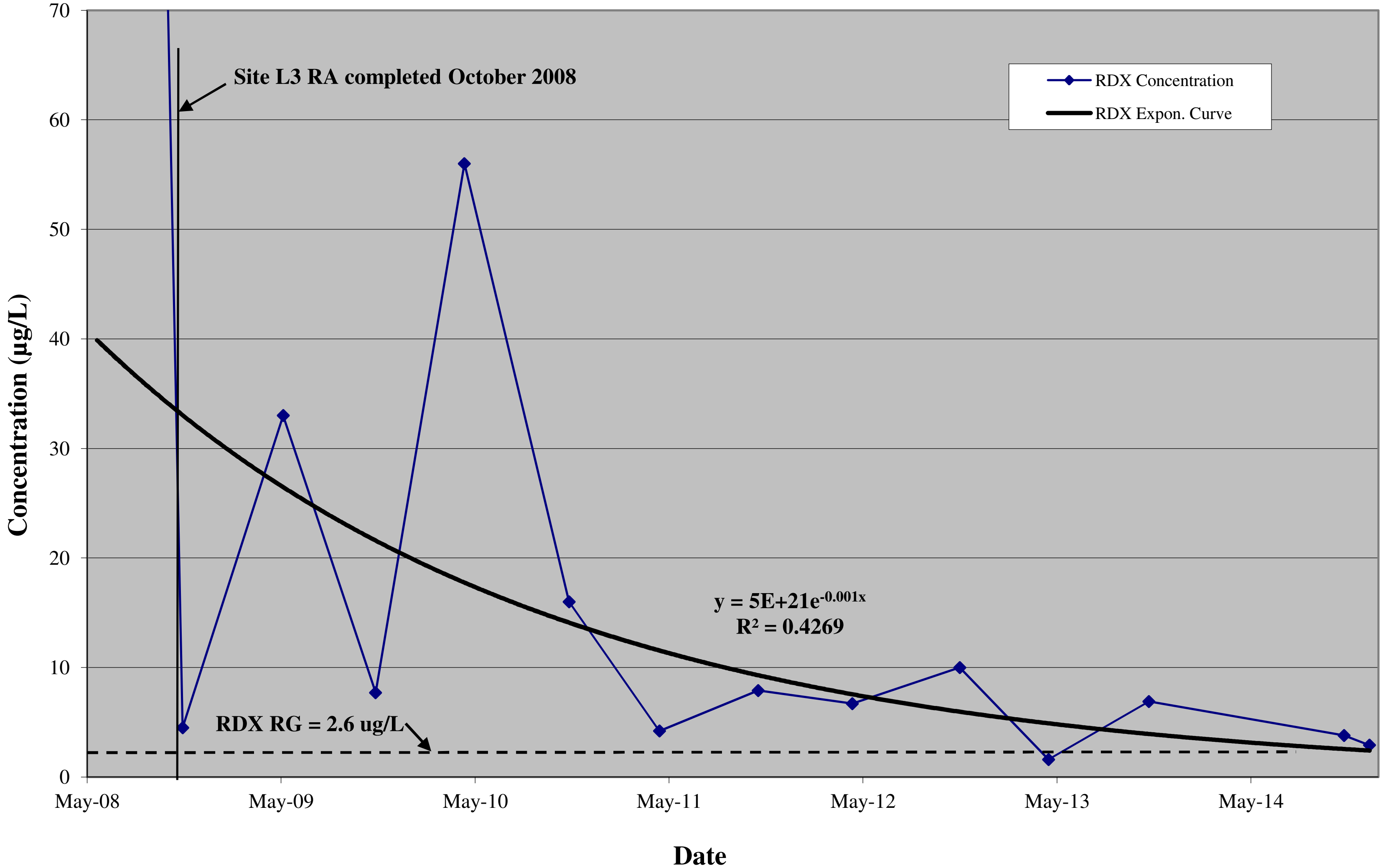
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E7_L3 MW630 Trend Analysis.xls(MW630 RDX)

Figure E-8

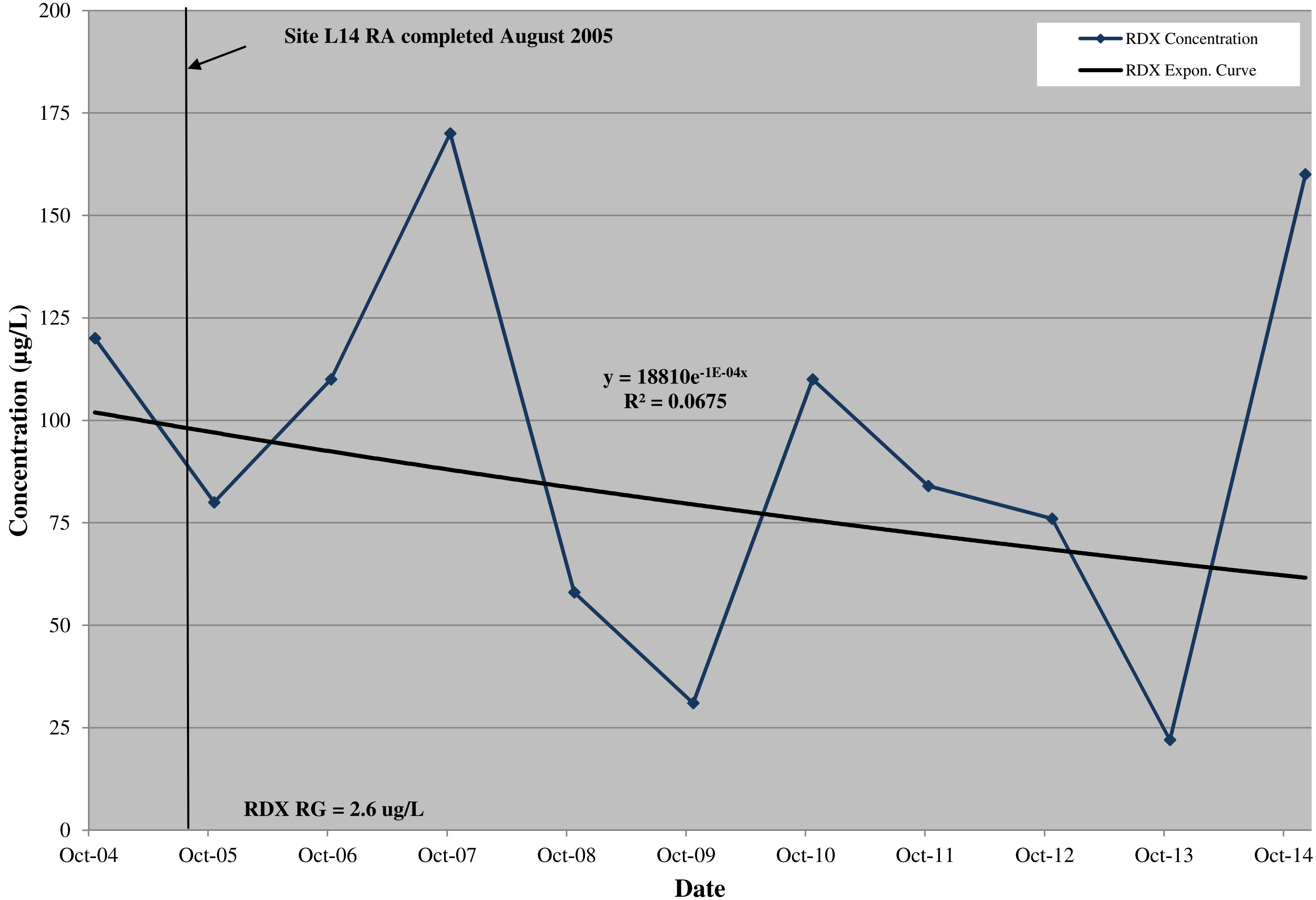
Site L3 - MW633
First Order Deacy Rate Constant Estimation - RDX
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



RJR/rjr/CRS
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E8_L3 MW633 Trend Analysis.xls(MW633 RDX)

Figure E-9

Site L14 - MW511
First Order Decay Rate Constant Estimation - RDX
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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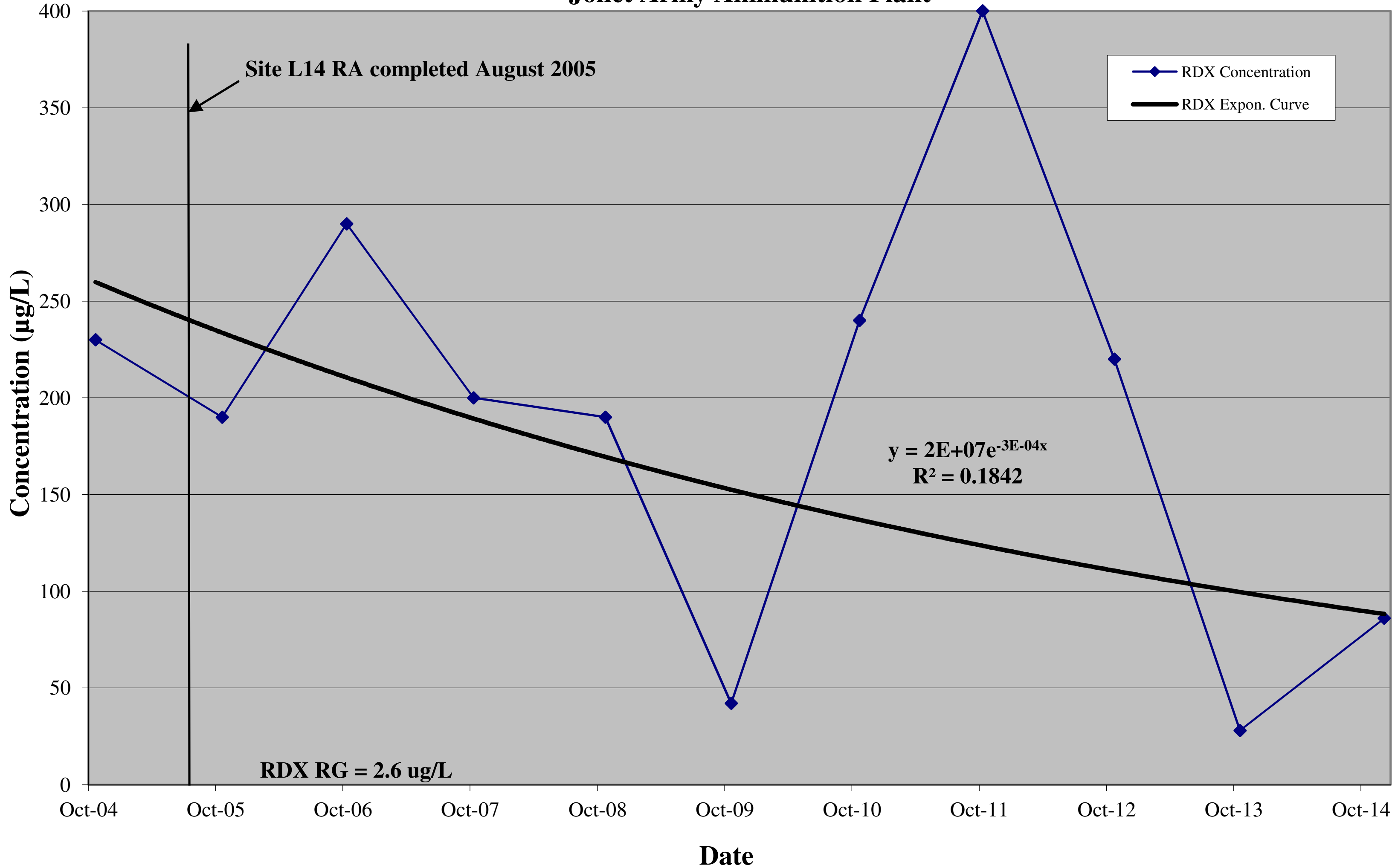
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E9_L14 MW511 Trend Analysis.xls(MW511 RDX)

Figure E-10

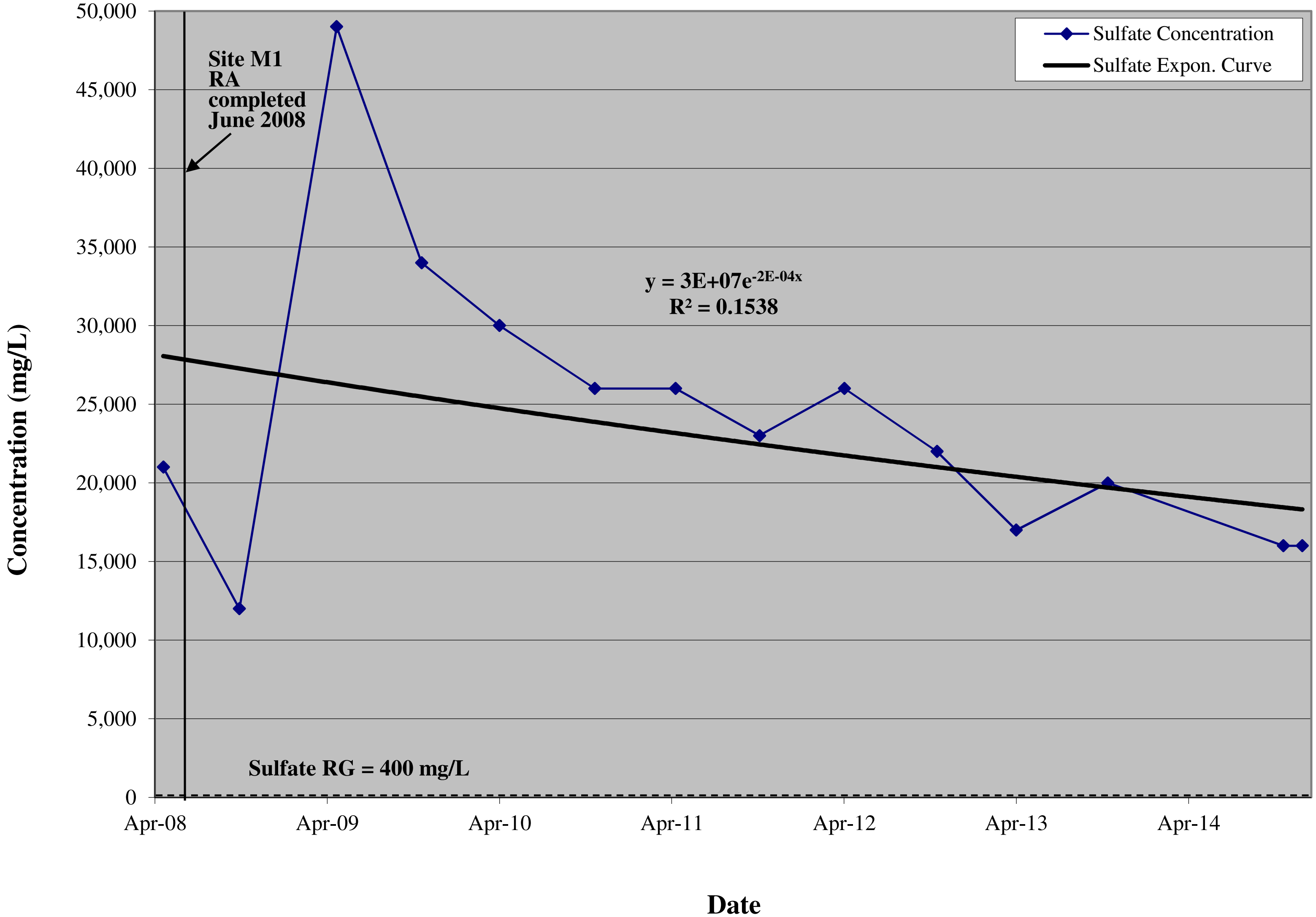
Site L14 - MW512
First Order Decay Rate Constant Estimation - RDX
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



RJR/rjr/CRS
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E10_L14 MW512 Trend Analysis.xls(MW512 RDX)

Figure E-11

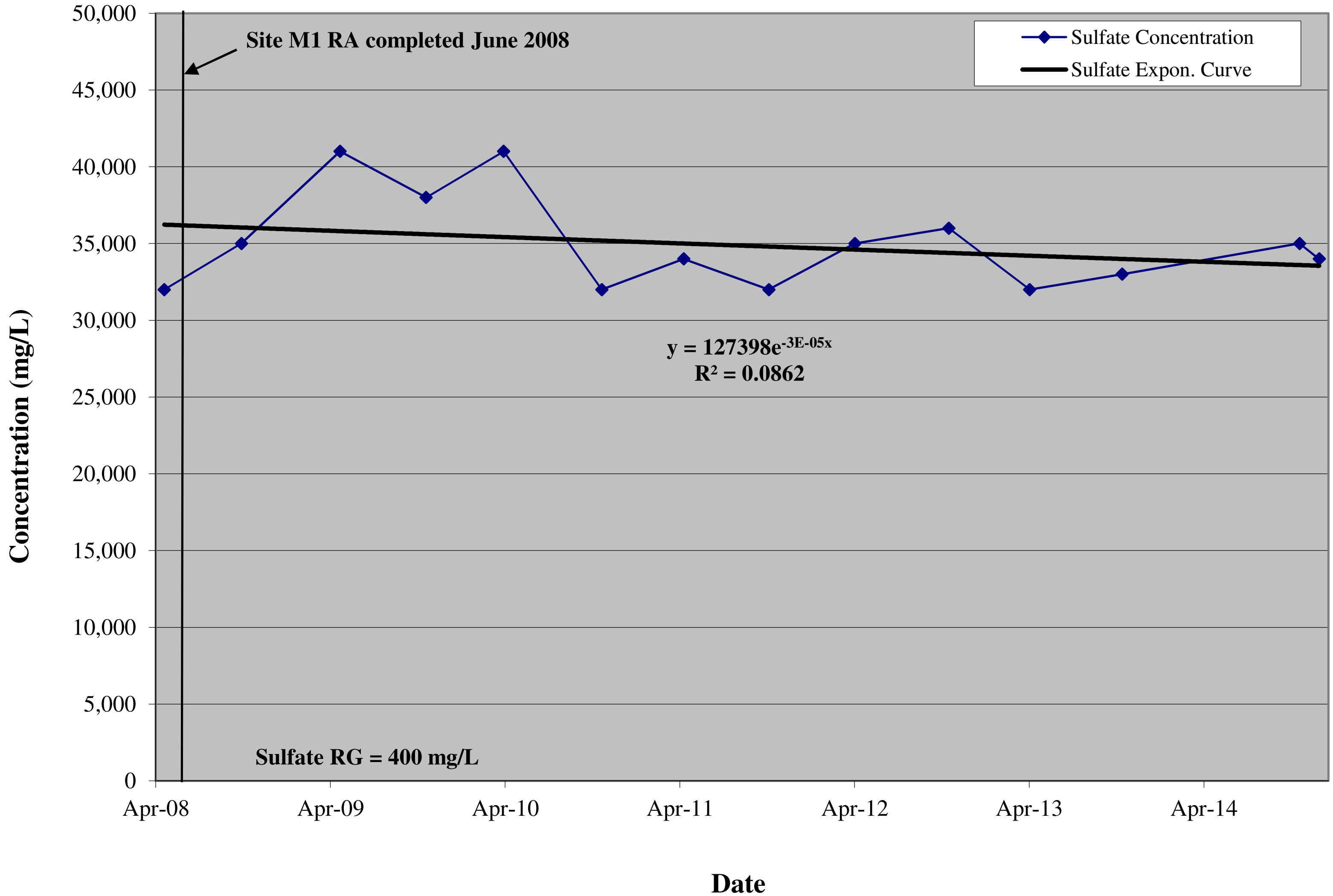
Site M1 - MW107
First Order Decay Rate Constant Estimation - Sulfate
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



RJR/rjr/CRS
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E11-15_M1 Trend Analysis.xls(MW107 Sulfate)

Figure E-12

Site M1 - MW231
First Order Decay Rate Constant Estimation - Sulfate
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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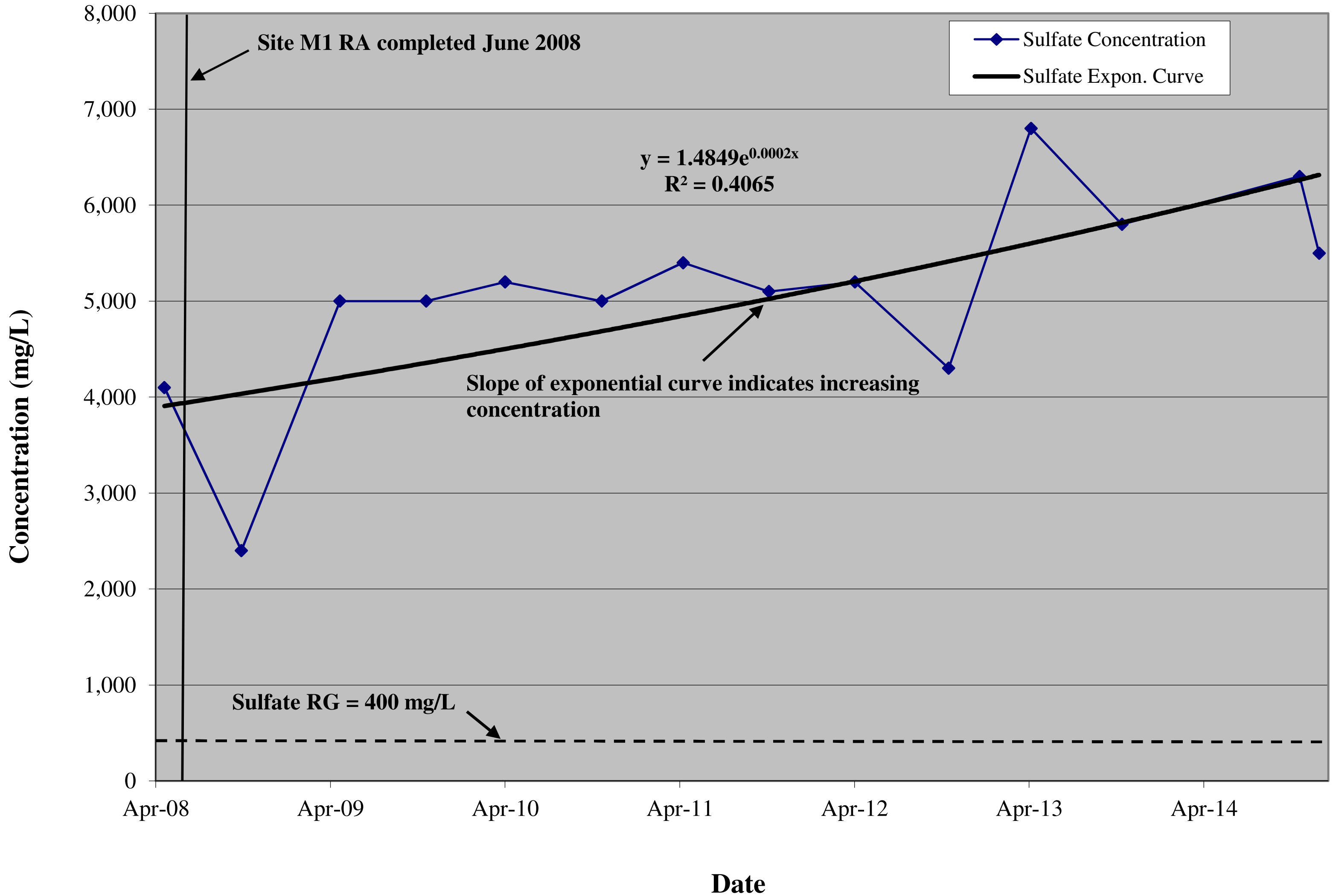
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E11-15_M1 Trend Analysis.xls(MW231 Sulfate)

Figure E-13

Site M1 - MW640
First Order Decay Rate Constant Estimation - Sulfate
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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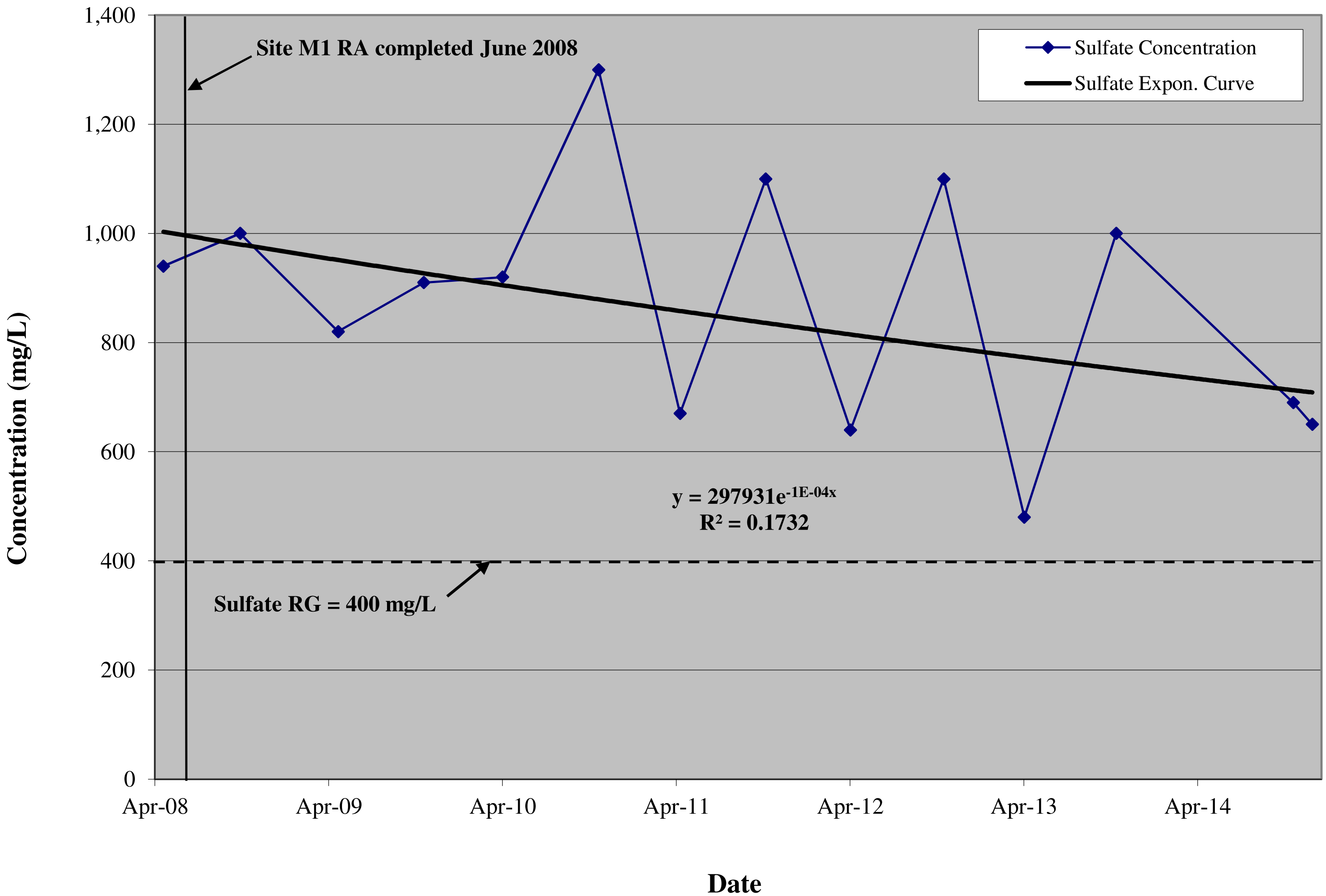
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E11-15_M1 Trend Analysis.xls(MW640 Sulfate)

Figure E-14

Site M1 - MW641
First Order Decay Rate Constant Estimation - Sulfate
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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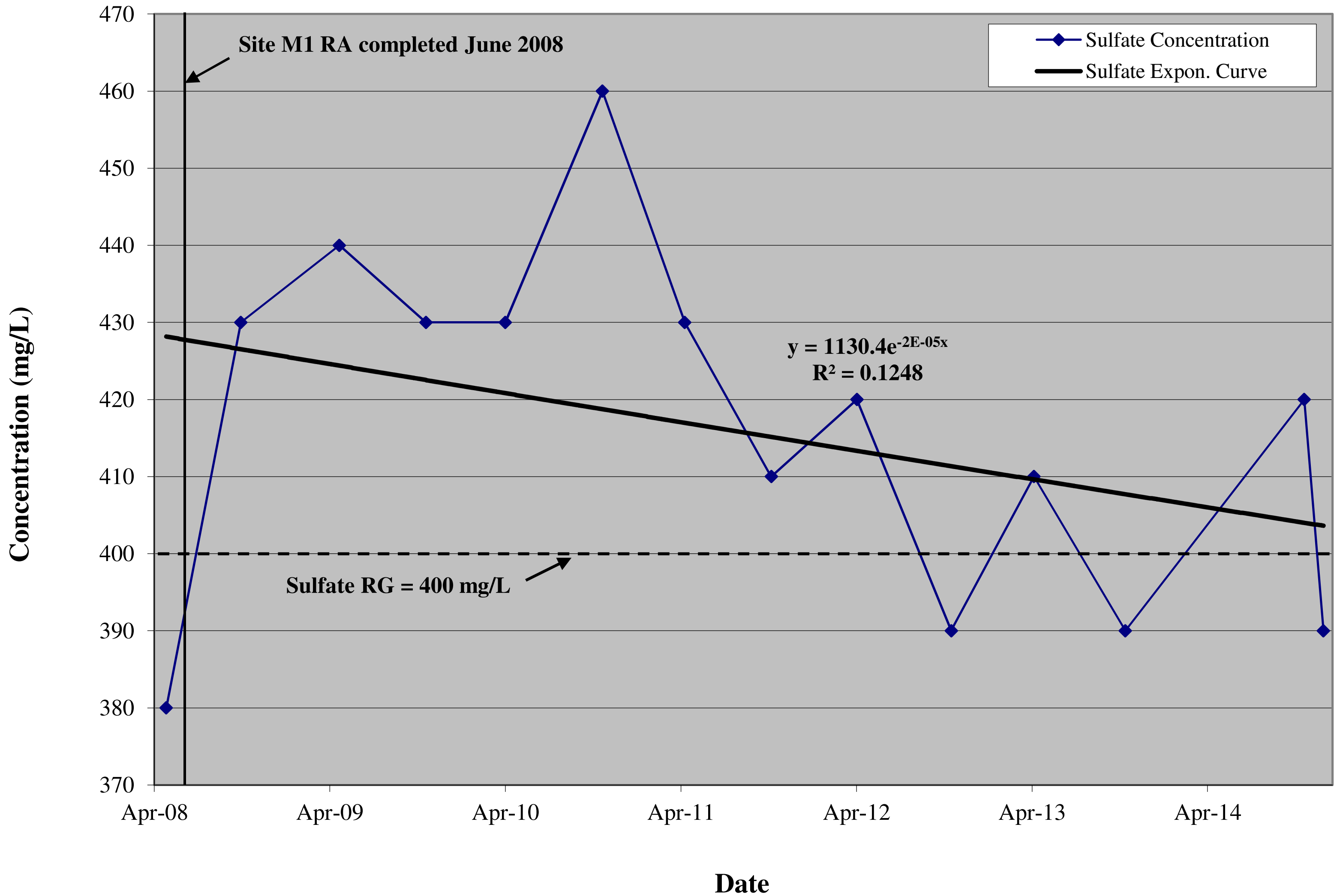
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E11-15_M1 Trend Analysis.xls(MW641 Sulfate)

Figure E-15

Site M1 - MW642
First Order Decay Rate Constant Estimation - Sulfate
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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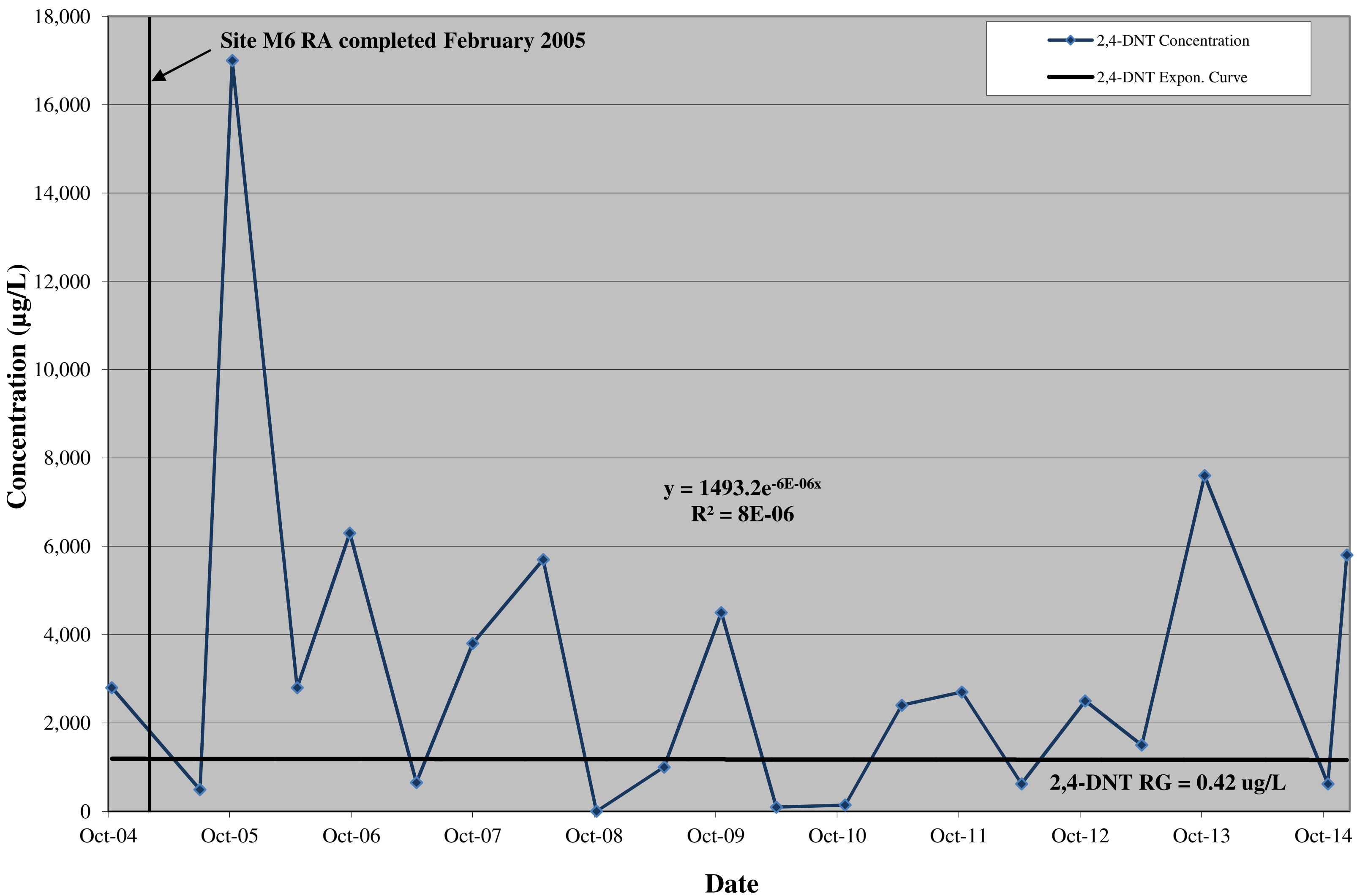
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E11-15_M1 Trend Analysis.xls(MW642 Sulfate)

Figure E-16

Site M6 - MW212R
First Order Decay Rate Constant Estimation - 2,4-DNT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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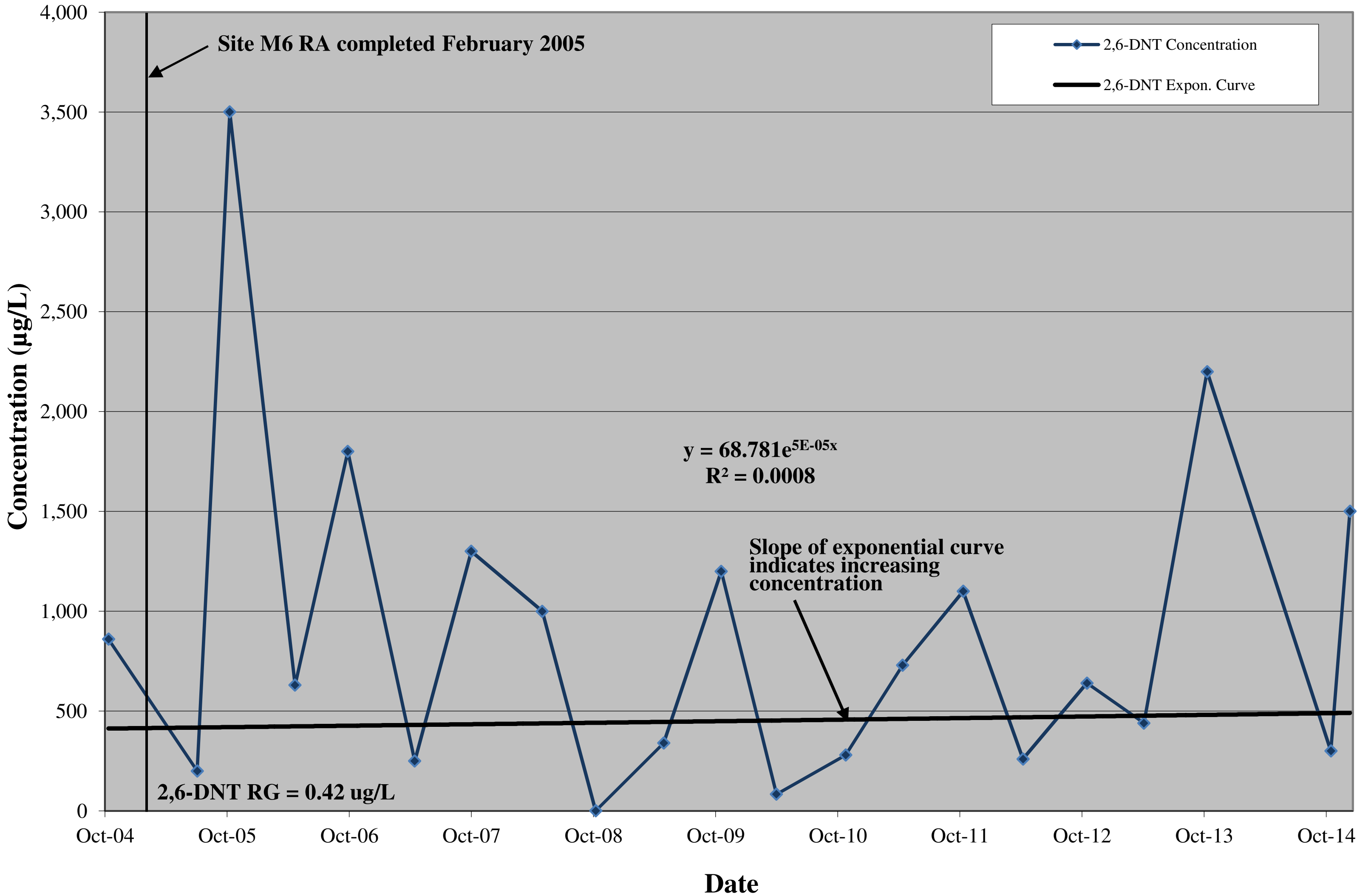
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E16-19_M6 MW212R Trend Analysis.xls

Figure E-17

Site M6 - MW212R
First Order Decay Rate Constant Estimation - 2,6-DNT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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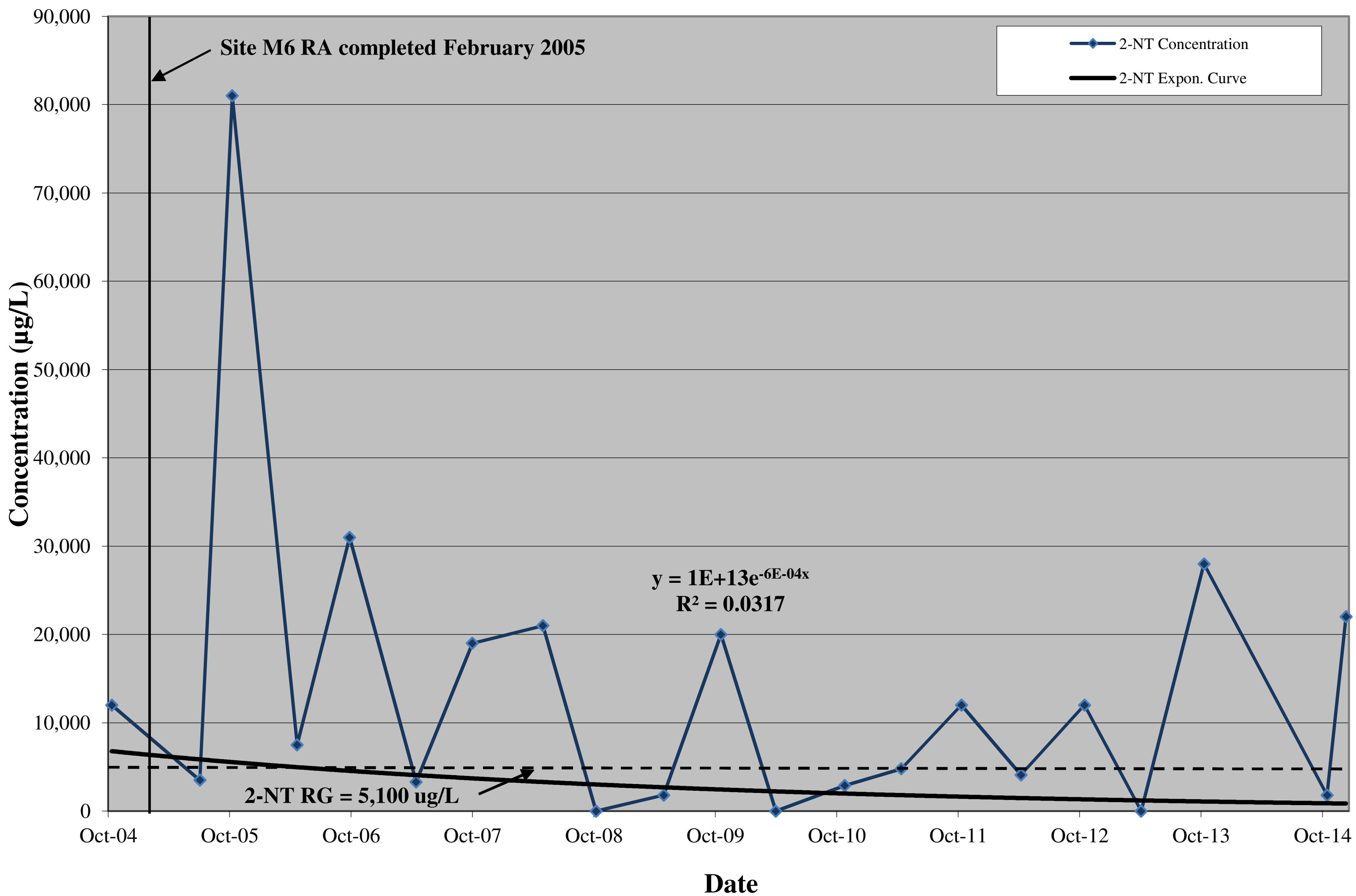
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E16-19_M6 MW212R Trend Analysis.xls

Figure E-18

Site M6 - MW212R
First Order Decay Rate Constant Estimation - 2-NT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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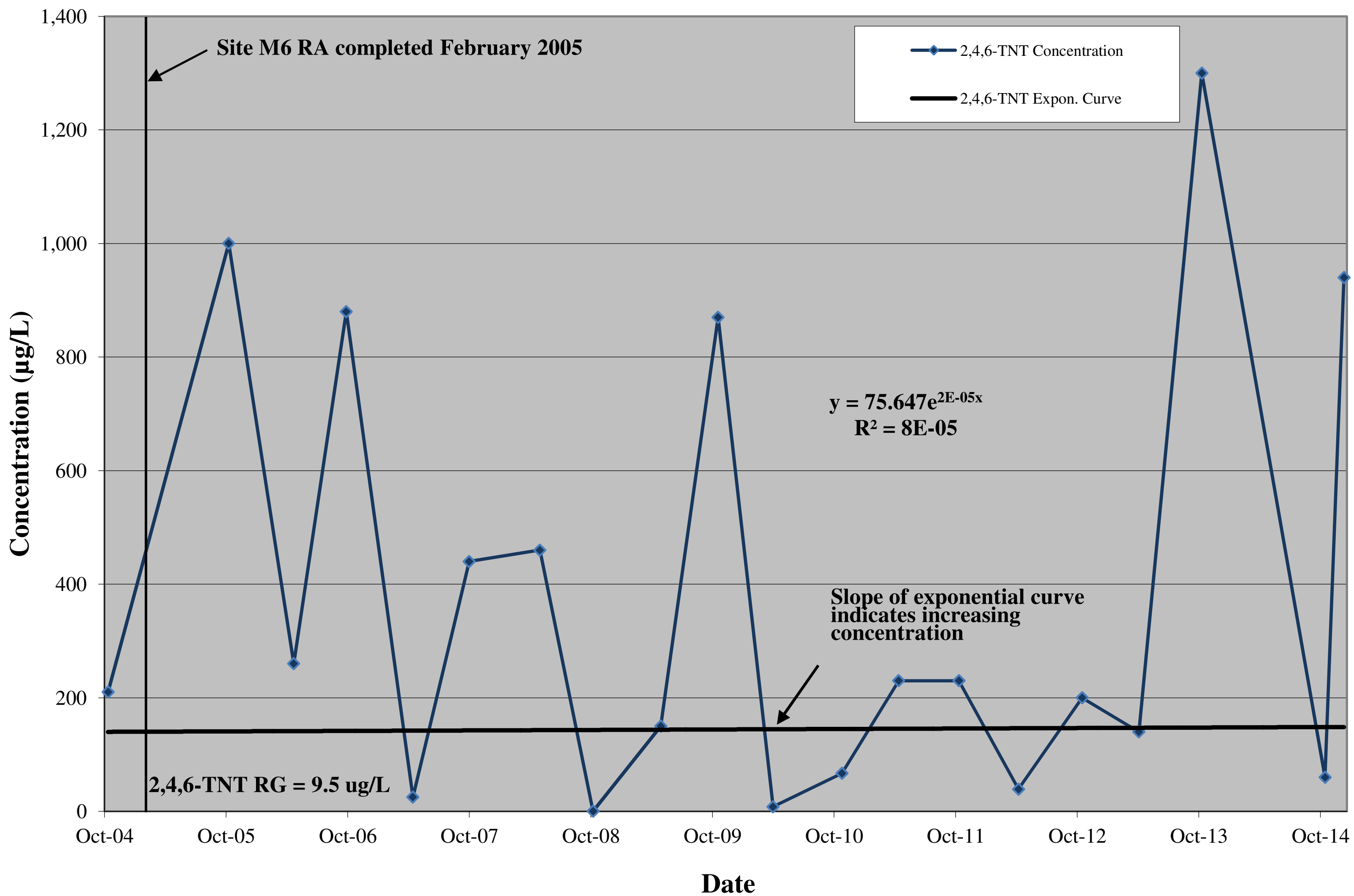
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E16-19_M6 MW212R Trend Analysis.xls

Figure E-19

Site M6 - MW212R
First Order Decay Rate Constant Estimation - 2,4,6-TNT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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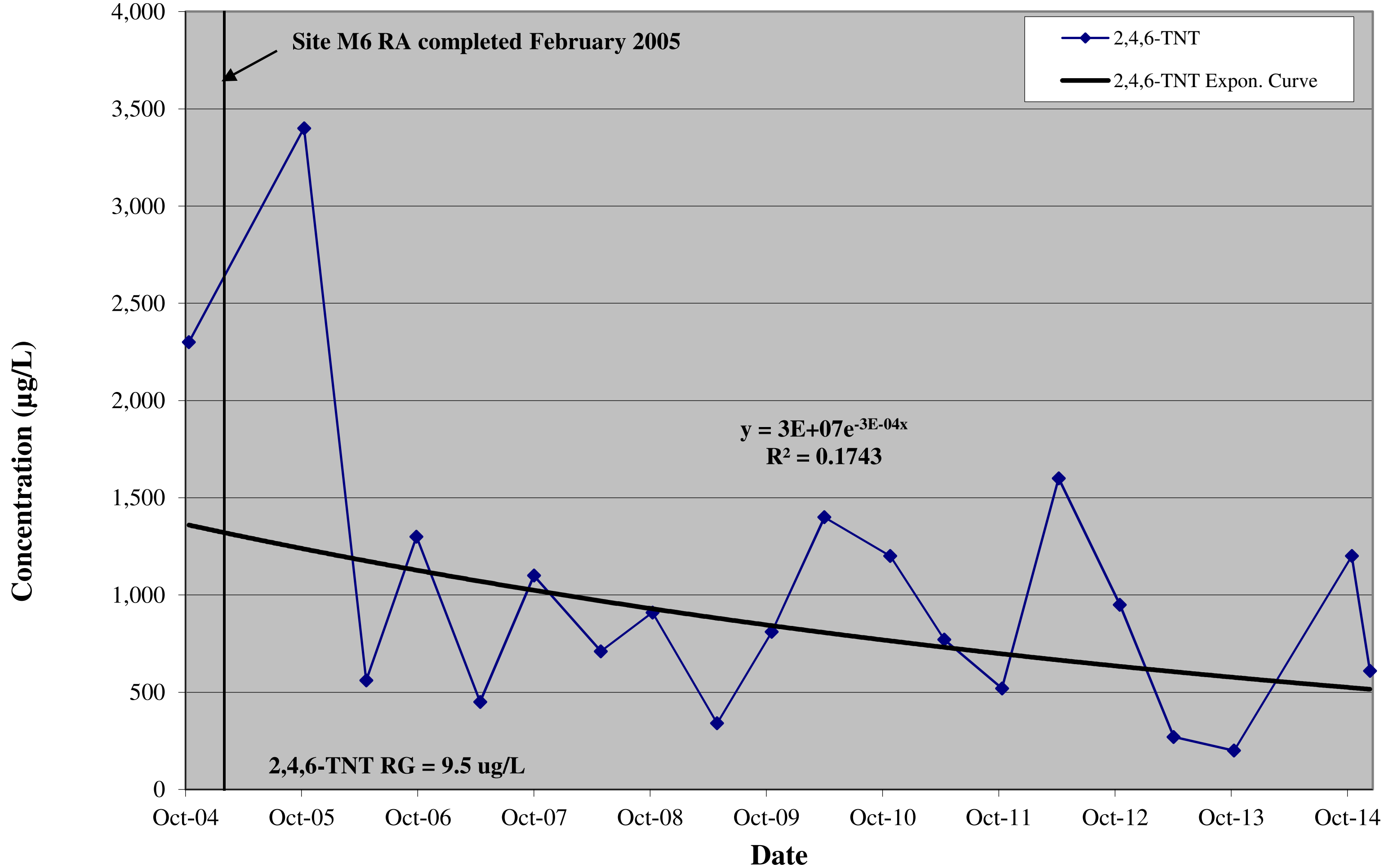
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E16-19_M6 MW212R Trend Analysis.xls

Figure E-20

Site M6 - MW652
First Order Decay Rate Constant Estimation - 2,4,6-TNT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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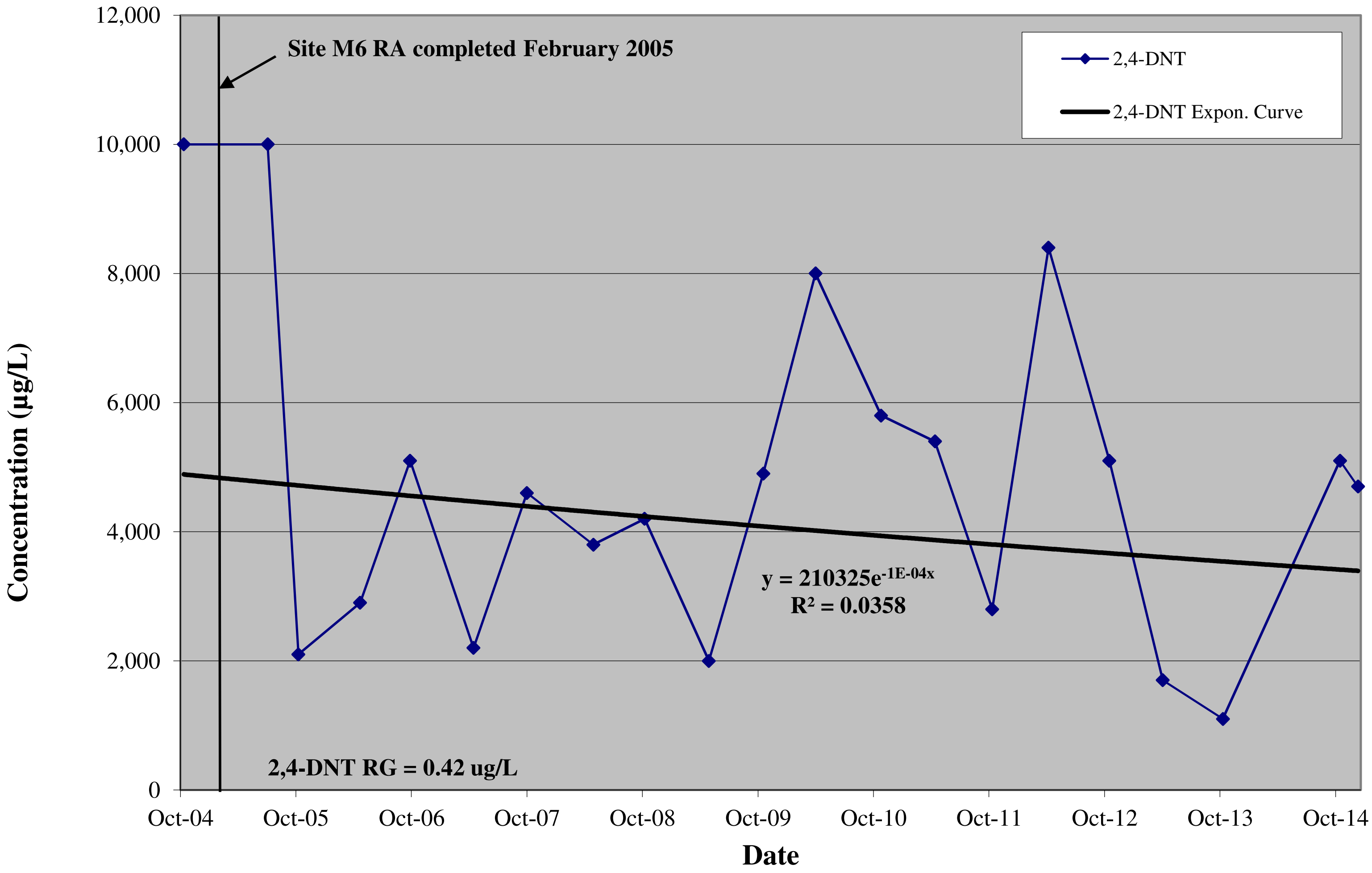
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E20-23_M6 MW652 Trend Analysis.xls(MW652 2,4,6-TNT)

Figure E-21

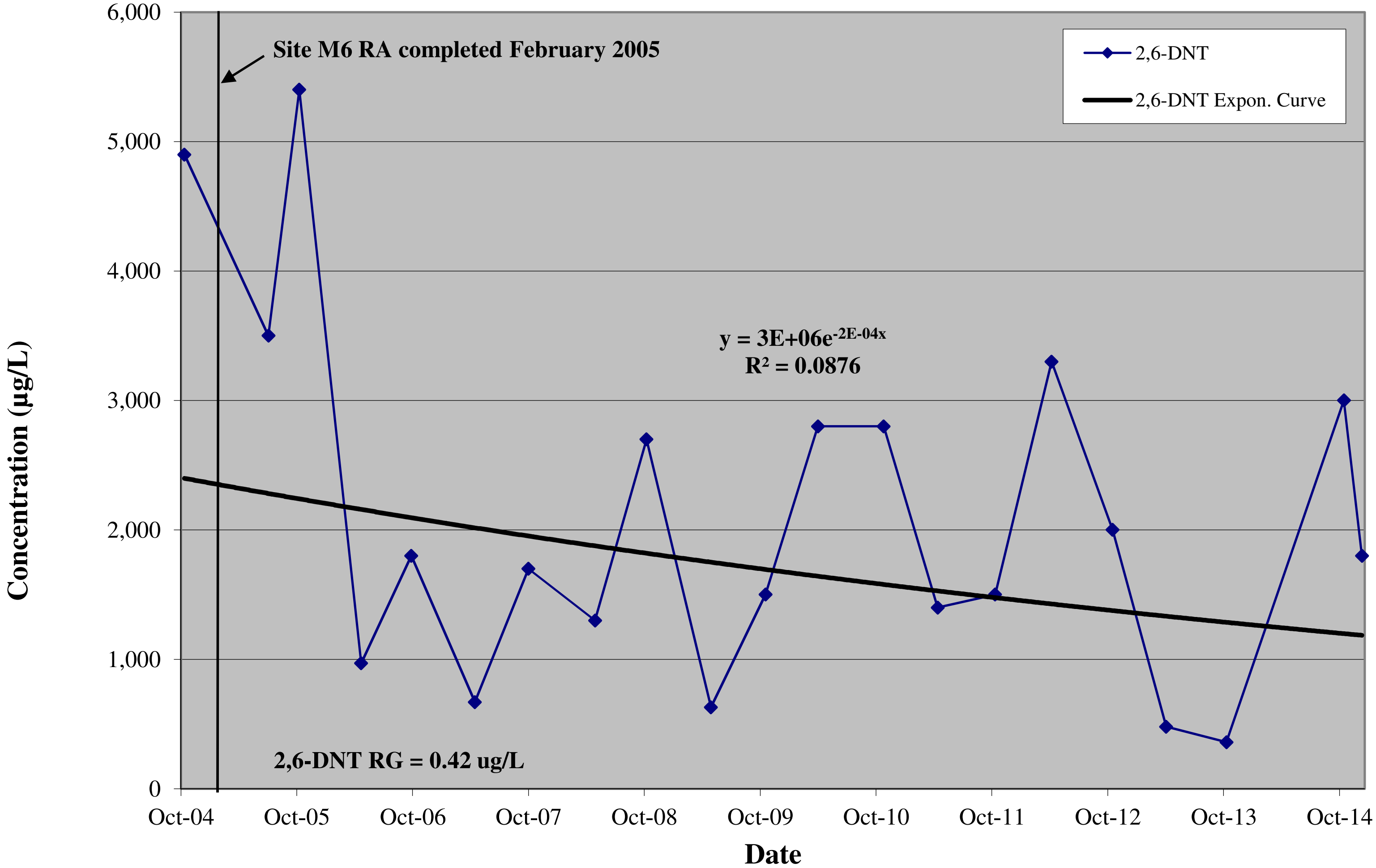
Site M6 - MW652
First Order Decay Rate Constant Estimation - 2,4-DNT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



RJR/rjr/CRS
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E20-23_M6 MW652 Trend Analysis.xls(MW652 2,4-DNT)

Figure E-22

Site M6 - MW652
First Order Decay Rate Constant Estimation - 2,6-DNT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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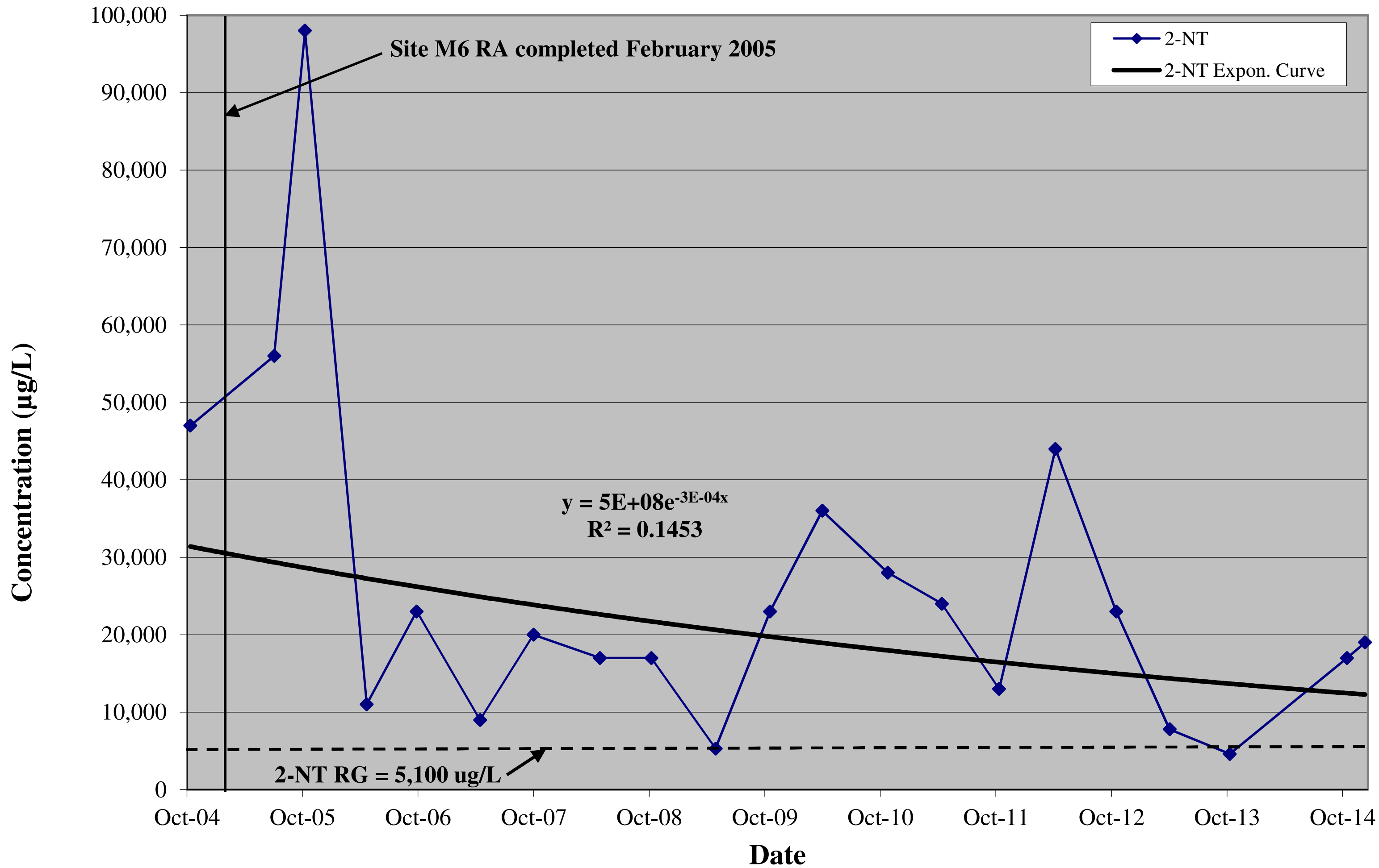
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E20-23_M6 MW652 Trend Analysis.xls(MW652 2,6-DNT)

Figure E-23

Site M6 - MW652
First Order Decay Rate Constant Estimation - 2-NT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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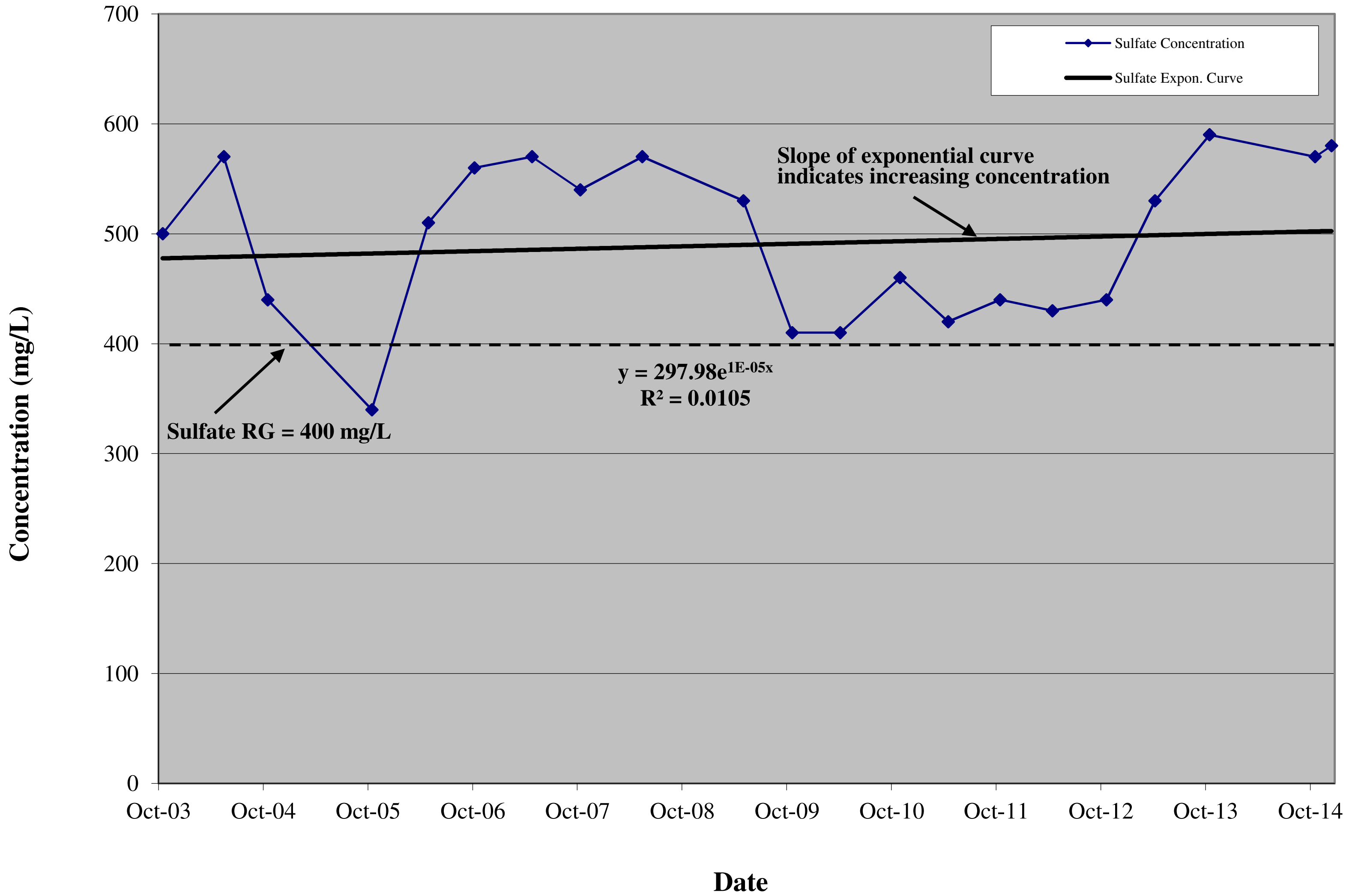
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E20-23_M6 MW652 Trend Analysis.xls(MW652 2-NT)

Figure E-24

Site M8 - MW330
First Order Decay Rate Constant Estimation - Sulfate
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E24_M8 Trend Analysis.xls(MW330 Sulfate)

Figure E-25

Site M6 - MW318
First Order Decay Rate Constant Estimation - 2,6-DNT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant

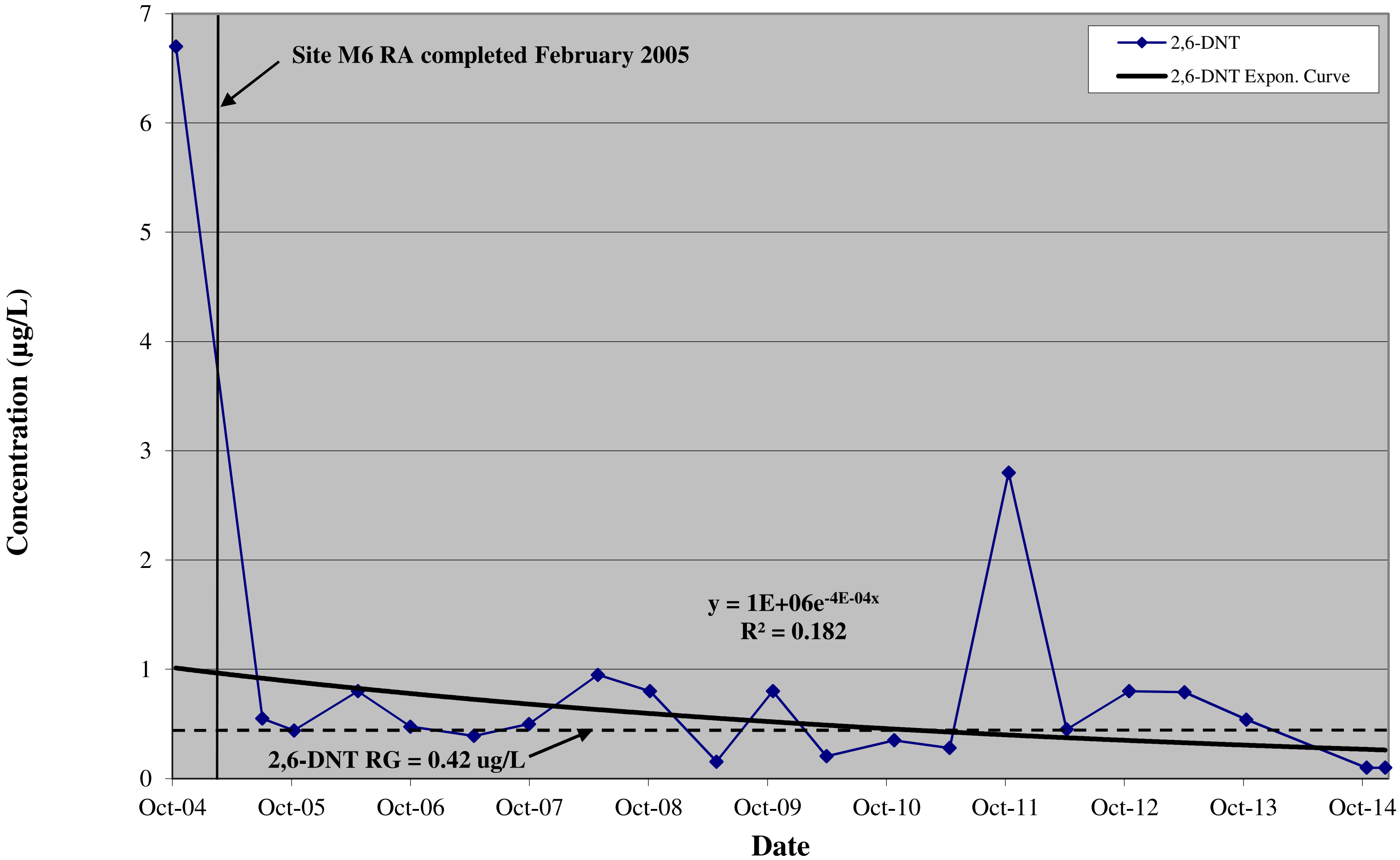

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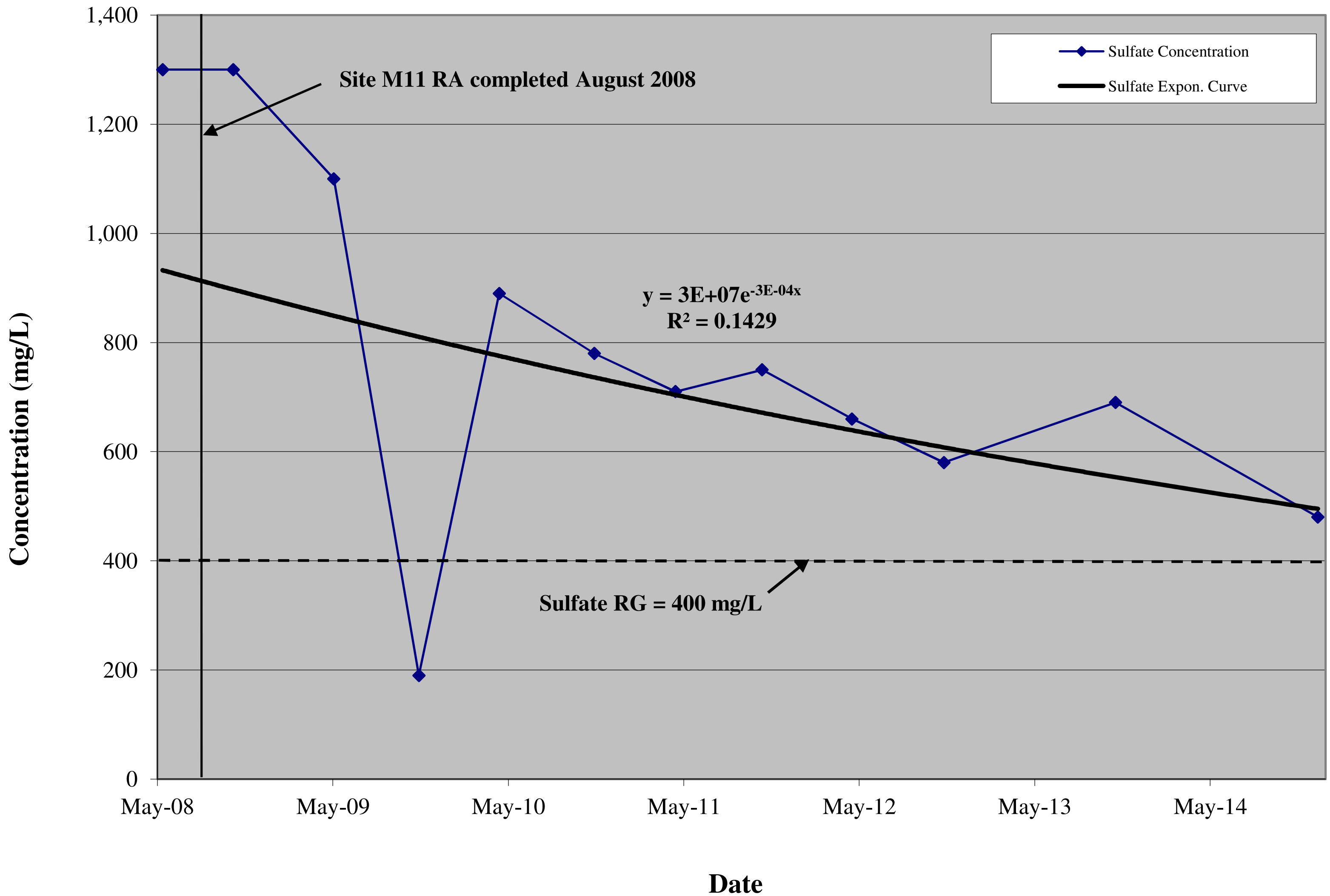
Figure E-26

Site M11 - MW335
First Order Decay Rate Constant Estimation - Sulfate
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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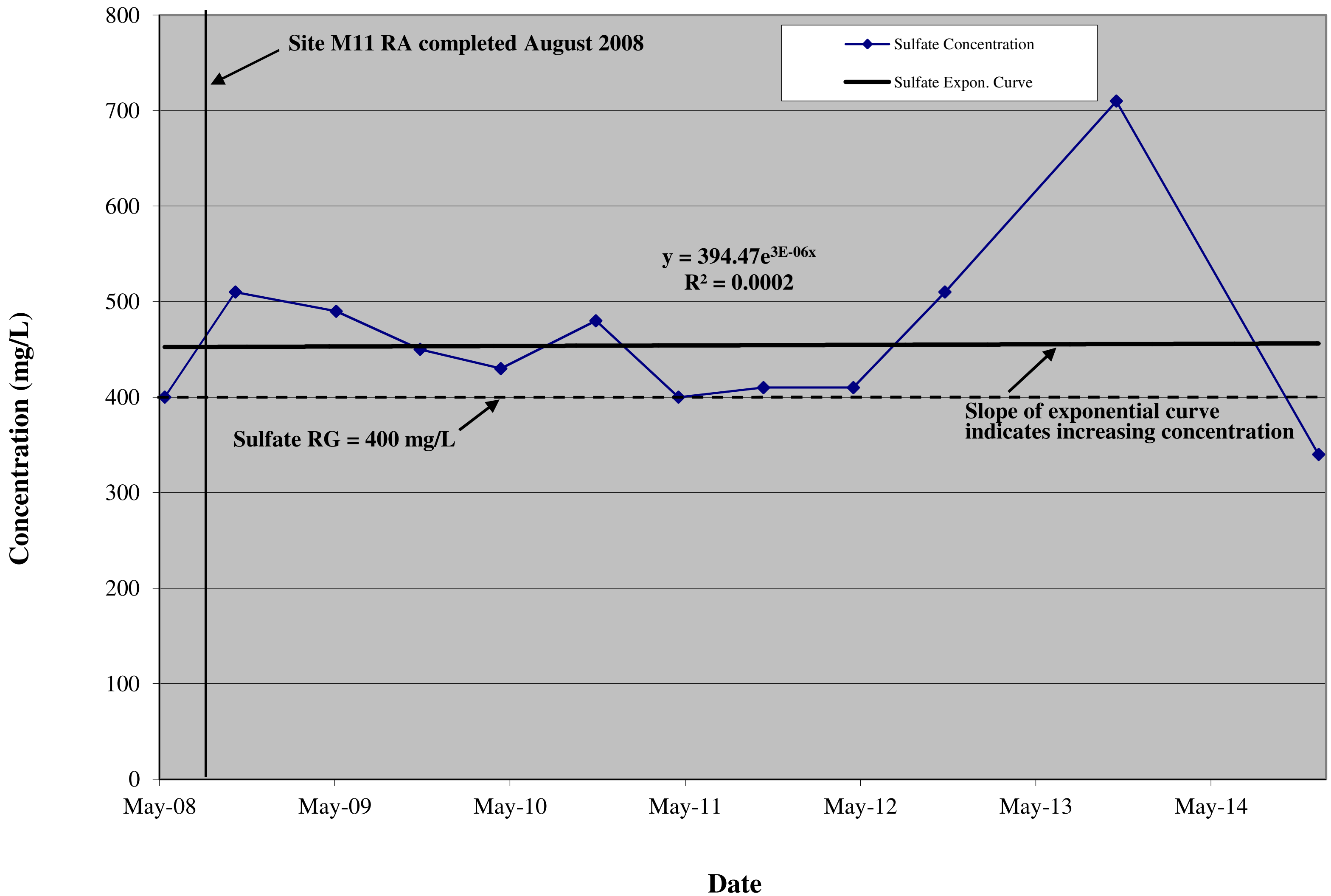
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E26-28_M11 Trend Analysis.xls(MW335 Sulfate)

Figure E-27

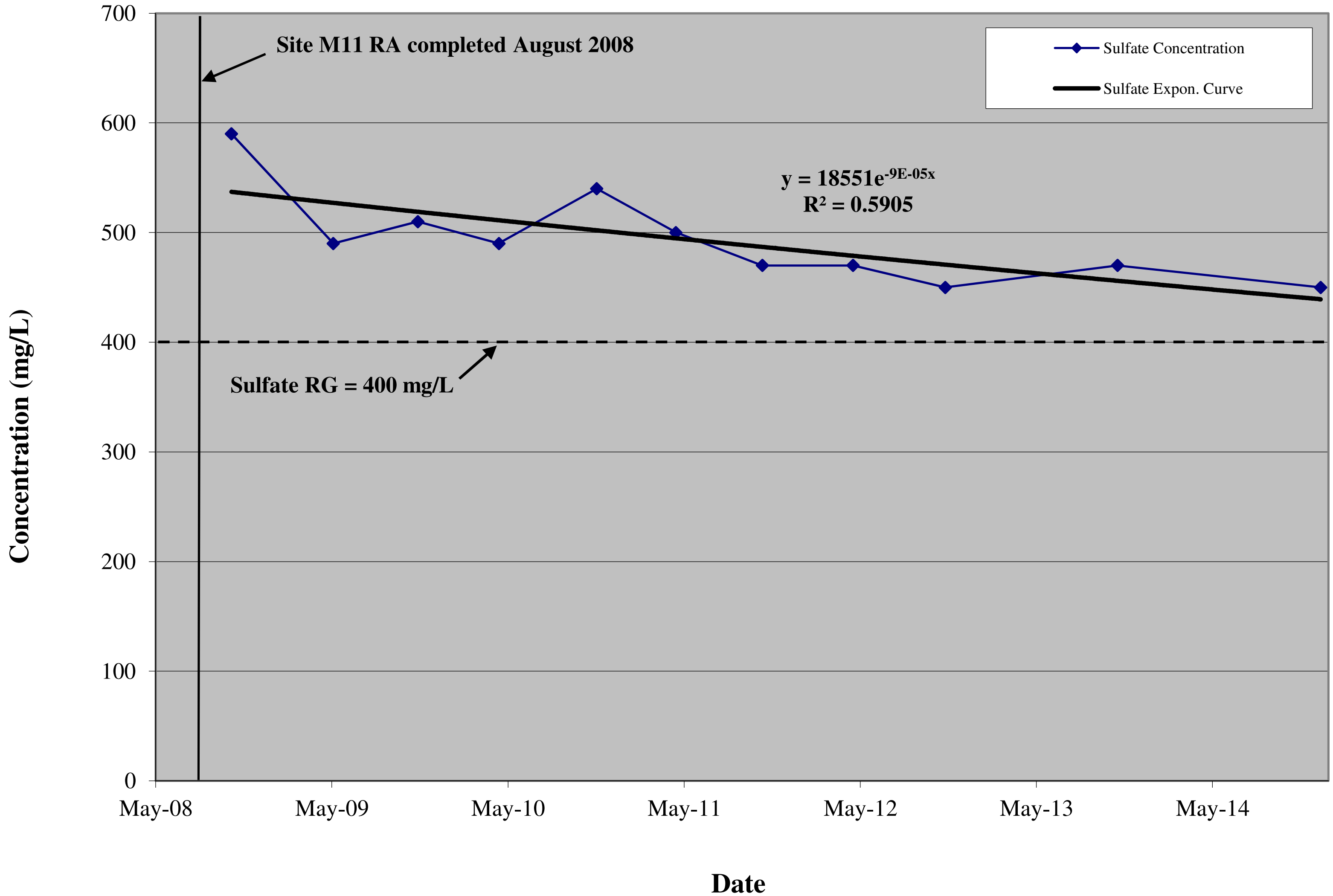
Site M11 - MW336
First Order Decay Rate Constant Estimation - Sulfate
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



RJR/rjr/CRS
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E26-28_M11 Trend Analysis.xls(MW336 Sulfate)

Figure E-28

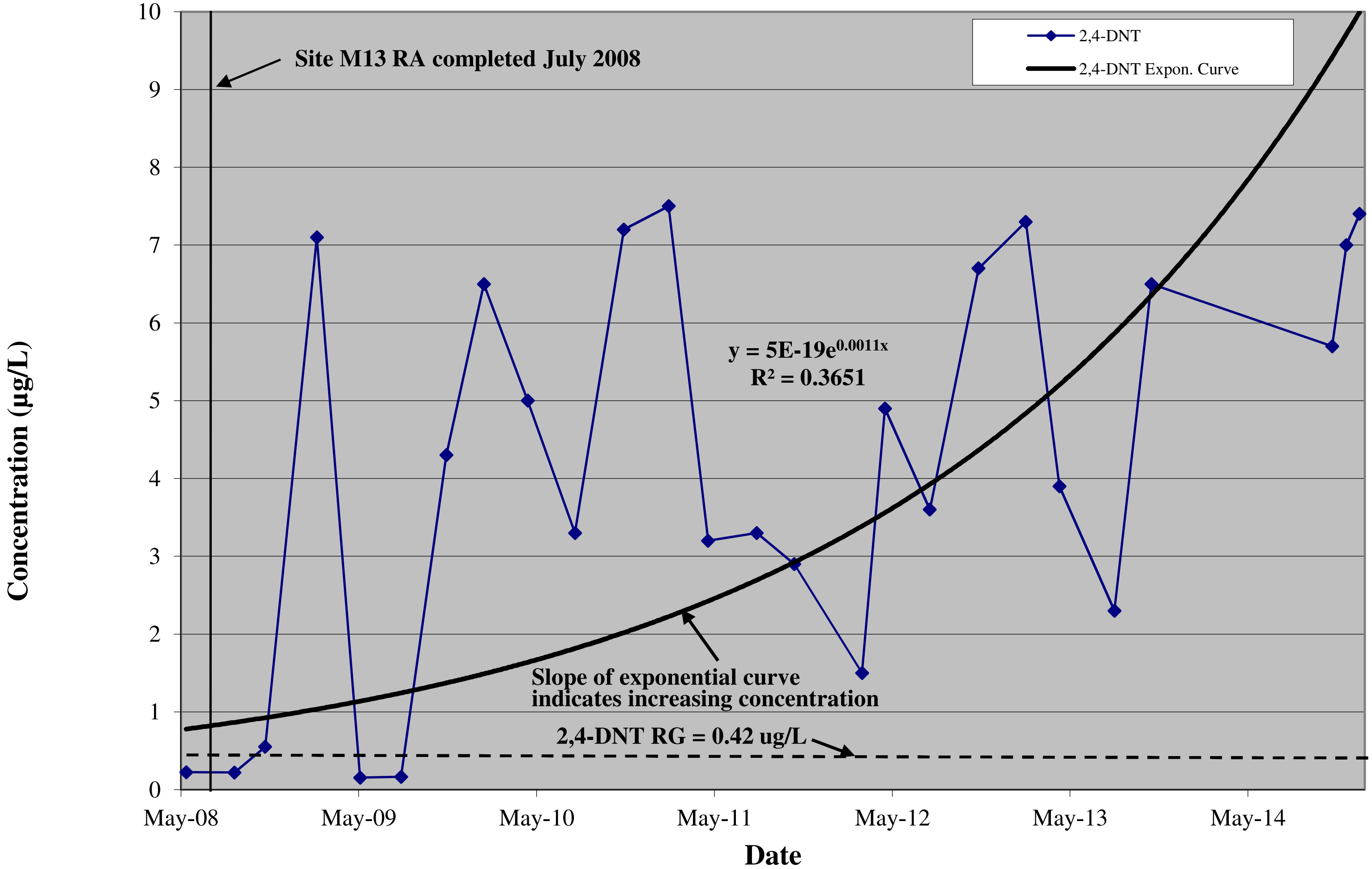
Site M11 - MW805
First Order Decay Rate Constant Estimation - Sulfate
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



RJR/rjr/CRS
\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E26-28_M11 Trend Analysis.xls(MW805 Sulfate)

Figure E-29

Site M13 - MW362
First Order Decay Rate Constant Estimation - 2,4-DNT
2014 Annual Groundwater Monitoring Report
Joliet Army Ammunition Plant



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\\usdet1s02\jobs\JOLIET 2014\2014 Annual GW Monitoring Report\Draft\Appendix E - First Order Rate Decay Trend Analysis\E1 - Trend Graphs\E29_M13 Trend Analysis.xls(MW362 2,4-DNT)

E2 – ESTIMATED CLEAN-UP TIME: EXAMPLE CALCULATION

EXPECTED CLEAN-UP TIME: EXAMPLE CALCULATION

The following example calculation illustrates the use of existing groundwater quality data to project future contaminant reduction rates. This analysis calculates the projected time at which the concentration of a selected compound in a selected well is reduced to its RG. However, based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available. This particular example pertains to the reduction of RDX in well MW173 at Site L1 (Figure E-3). The end result of this calculation is shown in Table 3-6.

The contaminant reduction equation is based on the first order decay equation that describes biological degradation processes. This general equation is

$$C_t/C_0 = e^{-kt}$$

where

C_t = concentration at time t
C_0 = concentration at time zero
k = decay rate
t = time t

This equation was then fit using a regression analysis to available concentration vs. time data for RDX (see Figure E-3 for data for well MW173 at Site L1).

Equation 1

Contaminant Reduction Equation: $C = 200000000e^{-4E\text{-}04t}$

Where: C = contaminant concentration at time t
t = time after maximum concentration

In this regression analysis, the spreadsheet calculates a correlation coefficient (R^2). The closer R^2 is to 1.0, the greater the field data fit the first order decay equation describing biological decay. An R^2 value equal to 1.0 is an exact fit, and values which approach zero suggest a very poor fit. R^2 values are displayed on the plots used for the expected clean-up time analysis. R^2 values range between approximately 0.1 and 0.5, mainly due to seasonal variations in the data. At MW173 the R value for RDX is 0.2538.

The goal of this analysis is to estimate the time (T) at which the contaminant concentration reaches the site RG. Therefore, the contaminant reduction equation is solved for time (T) and Equation 1 becomes:

Equation 2

$$T = \frac{Ln\left(\frac{C}{200000000}\right)}{-0.0004}$$

In its simplest form, Equation 2 gives the concentration (C) at any time (T). With a few modifications, this relationship will yield the time (from present date) to clean-up. The information required for this calculation is obtained from Figure E-3.

Explosives Compound:	RDX
Maximum Concentration (C_o):	15 µg/L
Date of Initial Concentration (To):	2007
Remediation Goal (C_{RG}):	2.6 µg/L

The following steps are performed to arrive at the time required for reduction of the contaminant to the site RG.

<u>Step 1</u>: Determine the time (T) required for the maximum observed (initial) concentration (C_o) to degrade to the RG (C_{RG}) for that particular compound. This is accomplished by using Equation 2 and calculating the difference in time (T_{total}) between a concentration at a selected point in time (C_{t1} at time t1) and the RG (C_{RG}). This relationship is as follows:

Equation 3

$$T_{total} = \frac{Ln\left(\frac{C_{RG}}{200000000}\right)}{-0.0004} - \frac{Ln\left(\frac{C_{T1}}{200000000}\right)}{-0.0004}$$

Using C_{t1} = 15 µg/L in 2007, results in:

$$= \frac{Ln\left(\frac{2.6\ ug/L}{200000000}\right)}{-0.0004} - \frac{Ln\left(\frac{15\ ug/L}{200000000}\right)}{-0.0004}$$

$$T_{total} \cong 13 \text{ years after 2007}$$

Note: T_{total} represents the clean-up time in years past the time of C_{t1} (2007).

<u>Step 2</u>: Compute the time from the current reporting date (2014) to the time at which the RG is met. This would be:

Time from 2014 = T_{total} - (2014-2007)

This example calculation would be:

13 yrs – 7 yrs = 6 years from 2014

The end result of this example calculation estimates that RDX at well MW173 (Site L1) may degrade to the site RG of 2.6 µg/L in approximately 6 years from the current reporting date, or in the year 2020 (Table 3-6). Based on the variability of the data, primarily due to seasonal fluctuations, the calculated cleanup times are only an estimate based on the data available. It should be noted that this is an approximation only and that there are several other variables not considered in this analysis that may alter the future trend in contaminant reduction.